Volume 33 JUNE, 1949 Number 6

BULLETIN
of the
American Association *of* Petroleum Geologists

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REVIEW OF EXPLORATION AND DEVELOPMENTS IN 1948

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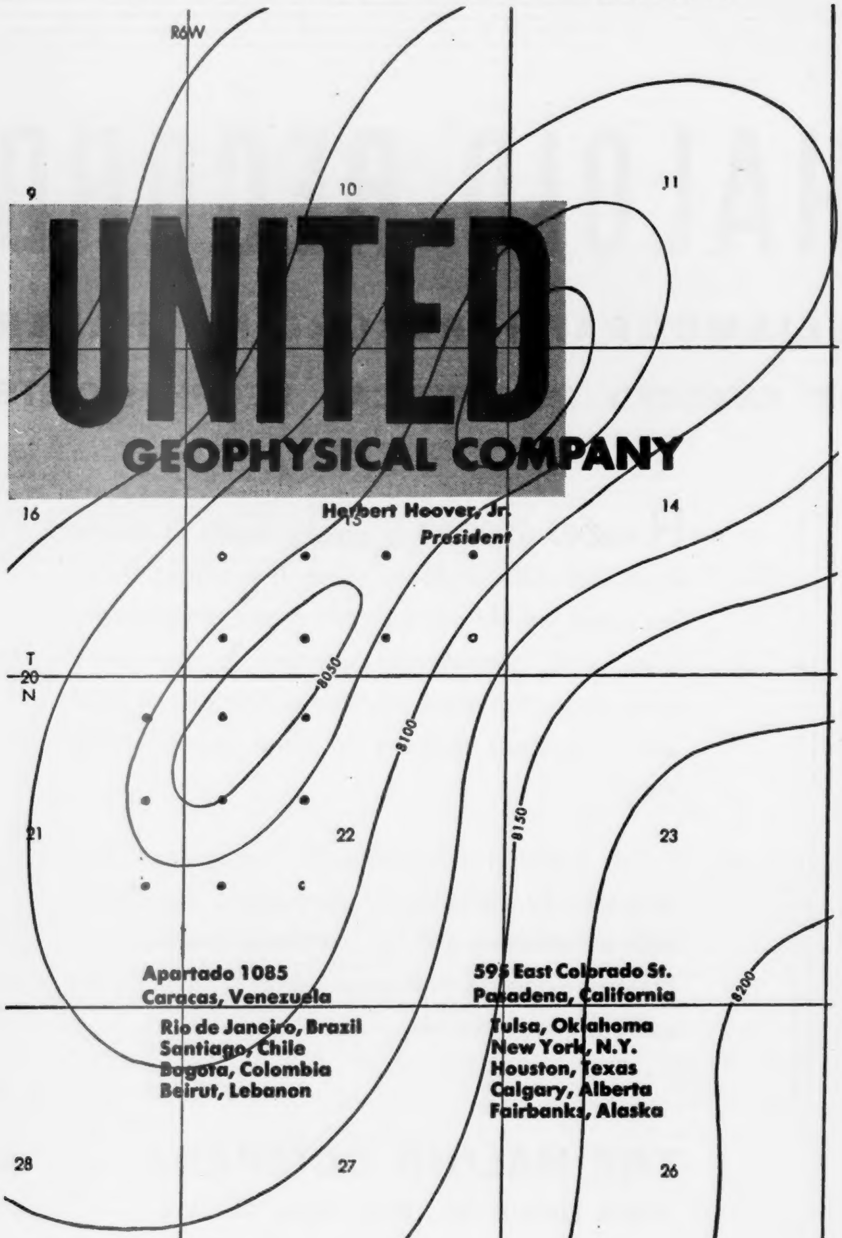
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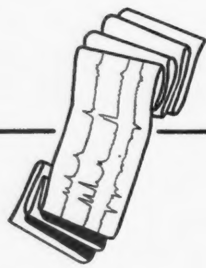

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BULLETIN
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JUNE, 1949

EXPLORATORY DRILLING IN 1948[1]

FREDERIC H. LAHEE,[2] *Chairman*
Dallas, Texas

ABSTRACT

This is the fourth annual report on data gathered by the committee on statistics of exploratory drilling.

During 1948, 8,013 exploratory holes were drilled in the United States. Of these, 4,296 were new-field wildcats, 1,951 were new-pool tests (including new-pool wildcats, deeper-pool tests, and shallower-pool tests), and 1,766 were outposts. Among the new-field wildcats, 501 were successful; among the new-pool tests, 472 were successful; and among the outposts, 490 were successful.

The total exploratory footage drilled in the United States in 1948 was 32,741,097 feet in the 8,013 holes, or 4,086 feet per hole. These figures compare with 26,393,348 feet drilled in 6,775 exploratory holes, with an average depth of 3,896 feet, in 1947. For the first time we are presenting data on Canada and Mexico.

This is the fourth annual report on data gathered and compiled by the committee on statistics of exploratory drilling. It is the twelfth article of its kind, written by the same author and printed each year in the June issue of the Association *Bulletin.* To the members of the main committee, and also to the numerous persons who helped on subcommittees, the chairman is happy to express his thanks for their able assistance. Following is a list of the committee members and others who contributed to the work.

Walter L. Ammon, assisted by Willis H. Alderman, Kenneth C. Beresford, Guy Sinclair, and Joe Van
A. H. Bell, assisted by Nancy Cassin, Richard J. Cassin, Lester W. Cutter, and Virginia Kline
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Coleman D. Hunter
Robert C. Lafferty, assisted by Arthur Y. Barney, W. B. Maxwell, Harvey J. Simmons, and Crannon Stanton

[1] Presented before the Association at St. Louis, March 16, 1949. Manuscript received, March 9, 1949.

[2] Geological and research counselor, Sun Oil Company; chairman, A.A.P.G. committee on statistics of exploratory drilling.

W. S. McCabe, assisted by John E. Blixt, A. W. Cullen, M. D. Hubley, E. W. Krampert, R. N. Larsen, R. L. Seilaff, and M. J. Walczak
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In previous years we have referred to exploratory drilling only in the United States. This year, for the first time, through the efforts of geologists in Mexico

TABLE I

CLASSIFICATION OF EXPLORATORY WELLS

<table>
<tr><td colspan="4" rowspan="3"></td><td rowspan="2">I. Classification When Drilling Is Started</td><td colspan="4">II. Classification After Completion or Abandonment</td></tr>
<tr><td colspan="2">Successful</td><td colspan="2">Unsuccessful</td></tr>
<tr><td>A</td><td colspan="2">B</td><td colspan="2">C</td></tr>
<tr><td colspan="4">Drilling for long extension of partly developed pool</td><td>1
Outpost
(Extension test)</td><td colspan="2">1
Extension well
(Sometimes a new-pool discovery well)</td><td colspan="2">1
Dry outpost
(Dry extension test)</td></tr>
<tr><td rowspan="3">Drilling for a new pool on a structure or in a geological environment already productive</td><td rowspan="3">New-pool tests</td><td rowspan="2">Drilling within limits of proved area of pool</td><td>For new pool above deepest pool</td><td>2a
Shallower-pool test</td><td rowspan="3">New-pool discovery wells (Or sometimes extension wells)</td><td>2a
Shallower-pool discovery well (Sometimes shallower-pool extension well)</td><td rowspan="3">Dry new-pool tests</td><td>2a
Dry shallower-pool test</td></tr>
<tr><td>For new pool below deepest pool</td><td>2b
Deeper-pool test</td><td>2b
Deeper-pool discovery well (Sometimes deeper-pool extension)</td><td>2b
Dry deeper-pool test</td></tr>
<tr><td colspan="2">Drilling outside limits of proved area of pool</td><td>2c
New-pool wildcat</td><td>2c
New pool discovery wildcat (Sometimes an extension well)</td><td>2c
Dry new-pool wildcat</td></tr>
<tr><td colspan="4">Drilling for a new field (on a structure or in an environment never before productive)</td><td>3
New-field wildcat</td><td colspan="2">3
New-field discovery wildcat</td><td colspan="2">3
Dry new-field wildcat</td></tr>
</table>

and Canada, we are able to report on the 1948 exploratory programs in those two countries. (See pp. 801–804)

Our committee has continued to use the classification of exploratory holes as outlined in Table I. All holes are grouped according to their preliminary classification (I), whether their original objective is attained, or not. Under this classification (I), the holes are then grouped according to their completion classi-

fication (II). It is to be noted that, while a majority of outposts, or, as we may also call them, "extension tests," if successful, are completed as extension wells, some discover new pools and therefore are completed as new-pool discovery wells. Similarly, any type of new-pool test, if successful, may sometimes be completed as an extension well rather than as a new-pool discovery well. These possibilities are indicated in parentheses under Col. B, 2a, 2b, and 2c, in Table I.

Definitions of the several types of exploratory hole are given on pages 631 to 634 of the summary for 1944.[3] Except where otherwise designated, the statistics recorded in the present report are similar to those used in our reports from 1939 to 1947, inclusive. All holes drilled below ground may be grouped as (1) those drilled for oil or gas, or (2) those drilled for other purposes. All holes drilled for oil or gas may be classed as (1) those which are *field-development wells*, located within or close to the developed part of an oil pool or gas pool (within the area of proved reserves), and drilled further to develop the pool or pools already partly developed; or (2) those which are *exploratory* in the sense that they are searching for new and as yet undiscovered pools or are searching for *long* extensions of pools already partly developed. We are here concerned only with the exploratory holes.

All exploratory holes are drilled either (1) on structures not yet producing, or (2) on structures already producing. Holes of the first of these two classes are *new-field wildcats*. Occasionally, where structures are ill-defined and porosity varies considerably within relatively short distances, exploratory holes may be grouped as new-field wildcats if they are 2 miles or more distant from the nearest production. Holes of the second class (on structures already producing) may be (1) *outside* the developed area (area of proved reserves),[4] in which case they will be either (a) outposts or (b) new-pool wildcats according to whether they are drilled (a) to extend a partly developed pool (reservoir) or (b) to explore for a new pool; or (2) *within* the proved developed area of the pool, in which case they may be deeper-pool tests (exploring *beneath* the deepest pool penetrated by the hole) or shallower-pool tests (exploring for a new pool *above* the deepest developed pool at the site of the well in question). There are very few exploratory holes that belong to this last class, i.e., shallower-pool tests. Most of the wells of this kind are field-development wells that happen to find new shallower pools. In other words, such holes were not drilled for the purpose of *exploring* for a shallower reservoir. Only rarely is such exploration undertaken, and then usually where suggestions of lensing or faulting indicate that there may be a chance for a shallower accumulation.

[3] "Exploratory Drilling in 1944," *Bull. Amer. Assoc. Petrol. Geol.*, Vol. 29, No. 6 (June, 1945), pp. 620–45.

[4] By "area of proved reserves" we mean the area which may definitely be said to have been proved for future production by the wells already drilled in the pool. This area includes the drilled producing units, those *inside* units which it is believed will surely produce when drilled, and in pools on reasonably simple structure, those *outside* units which adjoin the drilled producing units and which, likewise, it is believed will produce when drilled.

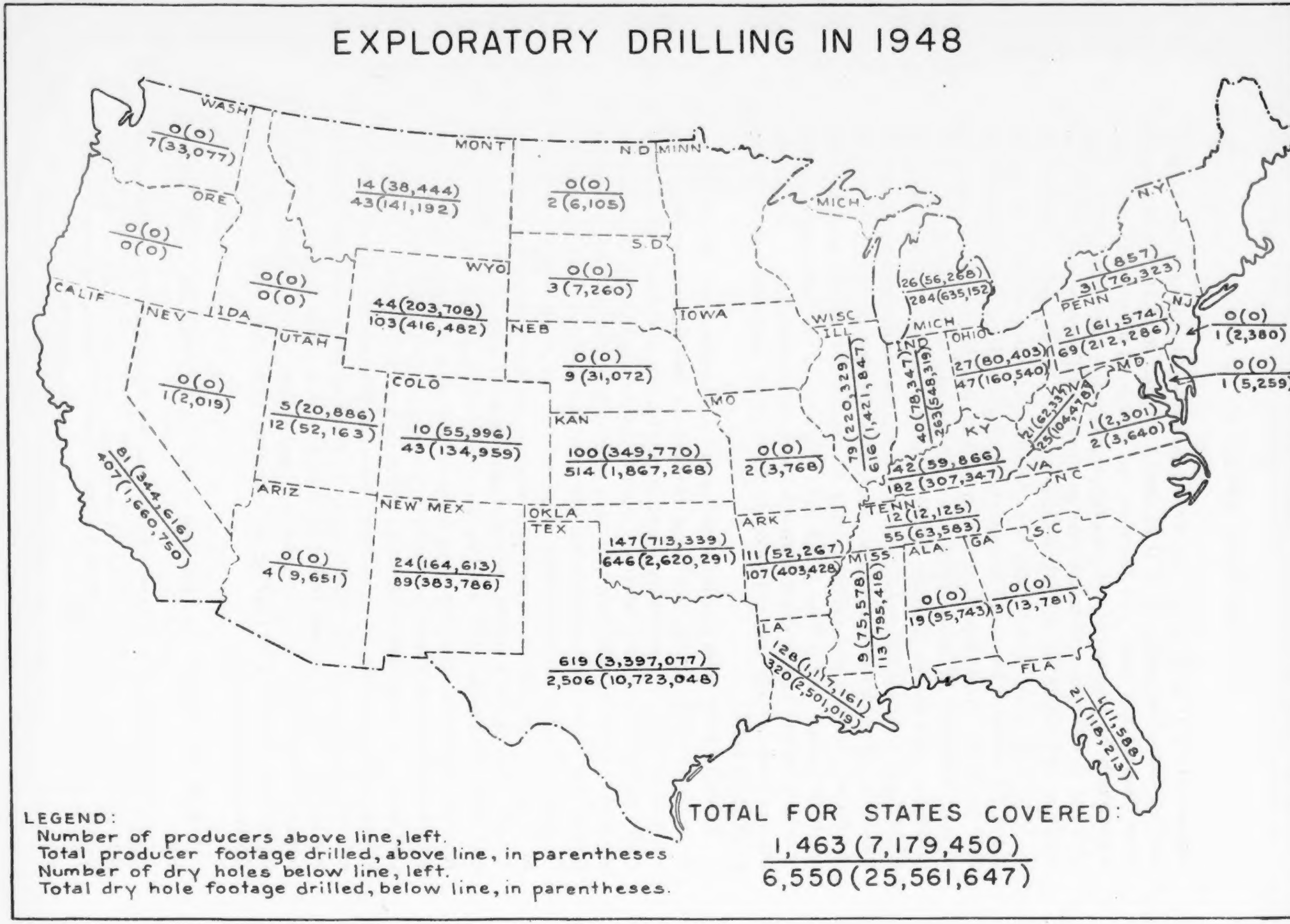
EXPLORATORY DRILLING IN 1948
WASH 0(0) / 7(33,077)
ORE 0(0) / 0(0)
CALIF 81(344,616) / 407(1,660,750)
NEV 0(0) / 1(2,019)
IDA 0(0) / 0(0)
MONT 14(38,444) / 43(141,192)
WYO 44(203,708) / 103(416,482)
UTAH 5(20,886) / 12(52,163)
ARIZ 0(0) / 4(9,651)
COLO 10(55,996) / 43(134,959)
NEW MEX 24(164,613) / 89(383,786)
N.D 0(0) / 2(6,105)
S.D 0(0) / 3(7,260)
NEB 0(0) / 9(31,072)
KAN 100(349,770) / 514(1,867,268)
OKLA 147(713,339) / 646(2,620,291)
TEX 619(3,397,077) / 2,506(10,723,048)
MINN
IOWA
MO 0(0) / 2(3,768)
ARK 11(52,267) / 107(403,428)
LA 128(1,117,161) / 320(2,501,019)
WISC
ILL 79(220,329) / 616(1,421,847)
MICH 26(56,268) / 284(635,152)
IND 40(78,347) / 263(548,319)
OHIO 27(80,403) / 47(160,540)
KY 42(59,866) / 182(307,347)
TENN 12(12,125) / 55(63,583)
MISS 9(75,578) / 113(795,418)
ALA 0(0) / 19(95,743)
GA 0(0) / 3(13,781)
FLA 4(11,588) / 21(118,213)
S.C
N C
VA 1(2,301) / 2(3,640)
W.VA 21(62,331) / 25(104,418)
MD 0(0) / 1(5,259)
PENN 21(61,574) / 69(212,286)
N.Y 1(857) / 31(76,323)
NJ 0(0) / 1(2,380)
LEGEND:
Number of producers above line, left.
Total producer footage drilled, above line, in parentheses
Number of dry holes below line, left.
Total dry hole footage drilled, below line, in parentheses.
TOTAL FOR STATES COVERED:
1,463(7,179,450) / 6,550(25,561,647)

FIG. 1

Fig. 1

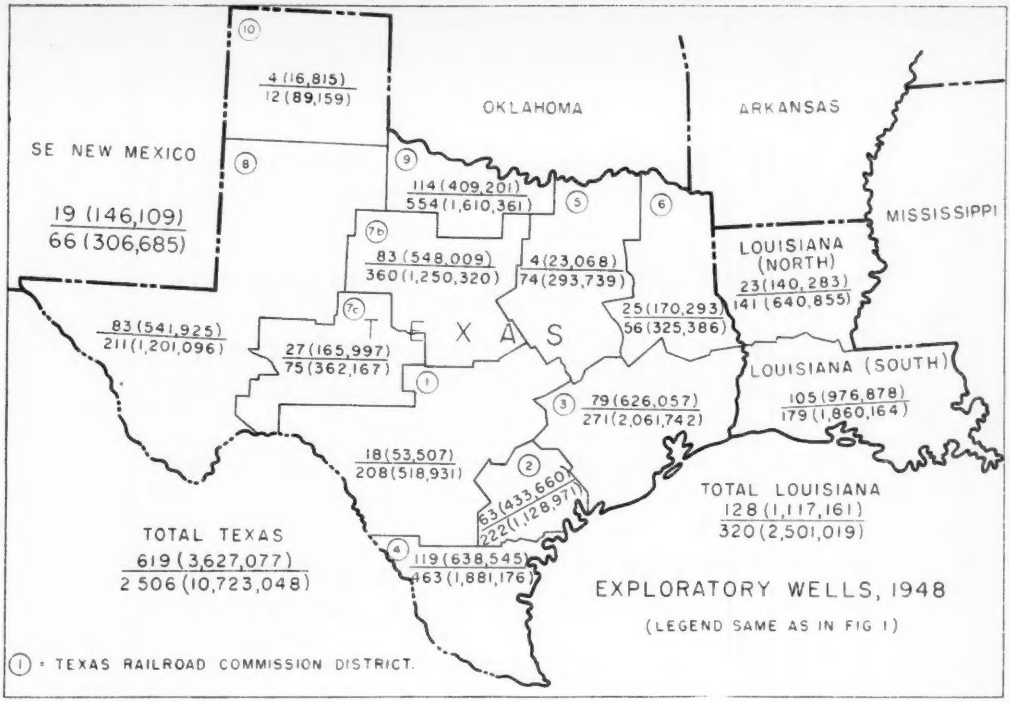

Fig. 2

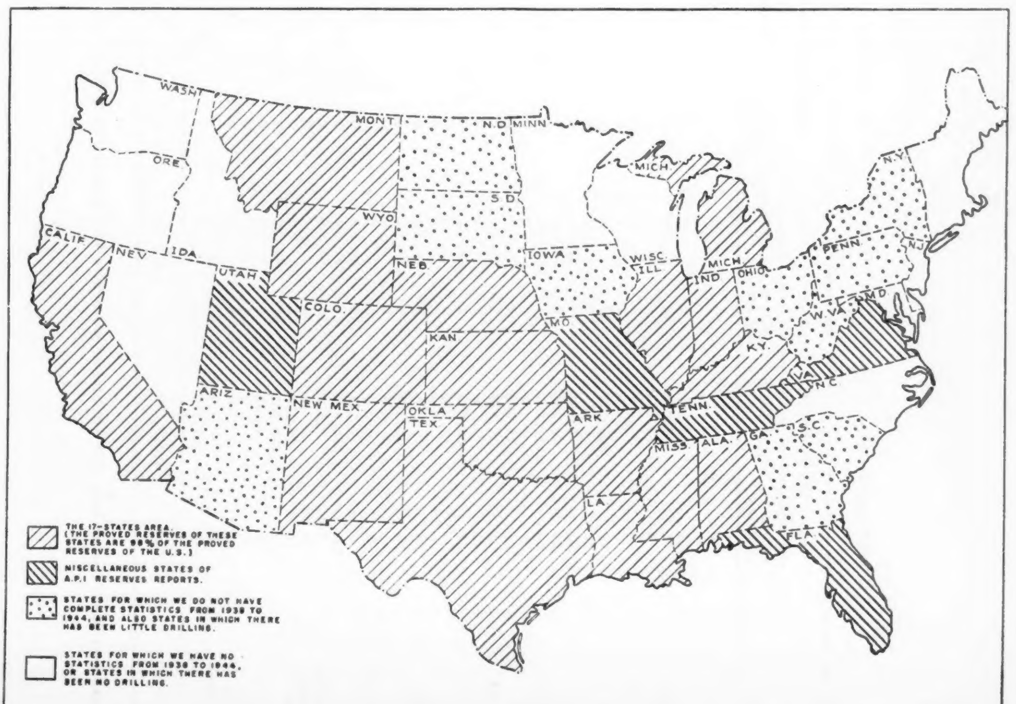

Fig. 3

TABLE II

NUMBER OF OIL WELLS, GAS WELLS, CONDENSATE WELLS, AND DRY HOLES DRILLED IN UNITED STATES AS EXPLORATORY TESTS IN 1948

States	Oil Producers		Gas Producers		Condensate Producers		Total Producers		Dry Holes		Grand Totals		Average Depth* of Hole
	Number of Holes	Footage	Number of Holes	Footage	Number of Holes	Footage	Number of Holes	Footage	Number of Holes	Footage	Number of Holes	Footage	
Alabama	0	0	0	0	0	0	0	0	19	95,743	19	95,743	—
Arizona	0	0	0	0	0	0	0	0	4	9,651	4	9,651	—
Arkansas	11	52,267	0	0	0	0	11	52,267	107	403,428	118	455,695	3,801
California	71	313,019	10	31,597	0	0	81	344,616	407	1,660,750	488	2,005,366	4,109
Colorado	4	23,654	6	32,342	0	0	10	55,996	43	134,959	53	190,955	3,603
Florida	1	11,588	0	0	0	0	1	11,588	21	118,213	22	129,801	—
Georgia	0	0	0	0	0	0	0	0	3	13,781	3	13,781	—
Illinois	79	220,329	0	0	0	0	79	220,329	616	1,421,847	695	1,642,176	2,363
Indiana	37	76,125	3	2,222	0	0	40	78,347	263	548,319	303	626,666	2,068
Kansas	91	310,769	9	39,001	0	0	100	349,770	514	1,867,268	614	2,217,038	3,611
Kentucky	34	46,686	8	13,180	0	0	42	59,866	182	307,347	226	367,213	1,624
Louisiana	69	554,106	14	113,225	45	449,830	128	1,117,161	320	2,501,019	448	3,618,180	8,076
Maryland	0	0	0	0	0	0	0	0	1	5,259	1	5,259	—
Michigan	22	47,973	4	8,295	0	0	26	56,268	284	635,152	310	691,420	2,230
Mississippi	5	34,618	2	19,274	2	21,686	9	75,578	113	795,418	122	870,996	7,139
Missouri	0	0	0	0	0	0	0	0	2	3,768	2	3,768	—
Montana	13	35,652	1	2,792	0	0	14	38,444	43	141,192	57	179,636	3,151
Nebraska	0	0	0	0	0	0	0	0	9	31,072	9	31,072	—
Nevada	0	0	0	0	0	0	0	0	1	2,019	1	2,019	—
New Jersey	0	0	0	0	0	0	0	0	1	2,380	1	2,380	—
New Mexico	16	122,819	8	41,794	0	0	24	164,613	89	383,786	113	548,399	4,853
New York	1	857	0	0	0	0	1	857	31	76,323	32	77,180	2,412
North Dakota	0	0	0	0	0	0	0	0	2	6,105	2	6,105	—
Ohio	9	17,075	18	63,328	0	0	27	80,403	47	160,540	74	240,943	3,256
Oklahoma	117	555,643	29	147,988	1	9,708	147	713,339	646	2,620,291	793	3,333,630	4,204
Pennsylvania	2	7,210	19	54,364	0	0	21	61,574	69	212,286	90	273,860	3,043
South Dakota	0	0	0	0	0	0	0	0	3	7,260	3	7,260	—
Tennessee	12	12,125	0	0	0	0	12	12,125	55	63,583	67	75,708	1,130
Texas	461	2,255,305	97	623,631	61	518,141	619	3,397,077	2,506	10,723,048	3,125	14,120,125	4,518
Utah	2	4,991	3	15,895	0	0	5	20,886	12	52,163	17	73,049	—
Virginia	0	0	1	2,301	0	0	1	2,301	2	3,640	3	5,941	—
Washington	0	0	0	0	0	0	0	0	7	33,077	7	33,077	—
West Virginia	0	0	21	62,337	0	0	21	62,337	25	104,478	46	166,815	3,626
Wyoming	41	180,368	2	10,324	1	13,016	44	203,708	103	416,482	147	620,190	4,219
TOTALS	1,098	4,883,179	255	1,283,890	110	1,012,381	1,463	7,179,450	6,550	25,561,647	8,013	32,741,097	4,086

* Averages have been recorded here only for states where more than 25 exploratory holes were drilled in 1948.

TABLE III

Basis for Locating New-Field Wildcats Drilled in 1948

States	Geology		Geophysics*		Geology & Geophysics*		Sundry Non-Technical		Unknown		Totals		GRAND TOTAL
	Producers	Dry Holes	Producers	Dry Holes	Producers	Dry Holes	Producers	Dry Holes	Producers	Dry Holes	Producers	Dry Holes	
Alabama	0	8	0	7	0	2	0	1	0	1	0	19	19
Arizona	0	1	0	0	0	0	0	2	0	1	0	4	4
Arkansas	0	59	2	12	2	13	0	1	0	12	4	97	101
California	14	145	0	2	4	32	0	23	0	12	18	214	232
Colorado	8	31	0	0	2	4	0	1	0	1	4	37	41
Florida	0	10	0	5	0	0	0	6	0	0	0	21	21
Georgia	0	0	0	2	0	0	0	1	0	0	0	3	3
Illinois	24	156	2	1	2	12	0	32	0	3	28	204	232
Indiana	14	70	0	1	0	3	0	65	6	56	20	195	215
Kansas	5	86	4	20	3	10	0	10	2	53	14	179	193
Kentucky	10	69	0	0	0	0	0	10	1	26	11	105	116
Louisiana	3	59	25	90	7	44	0	0	0	0	35	193	228
Maryland	0	1	0	0	0	0	0	0	0	0	0	1	1
Michigan	14	215	0	0	0	0	0	0	0	26	14	241	255
Mississippi	0	16	3	52	0	23	0	3	0	3	3	97	100
Missouri	0	0	0	0	0	0	0	0	0	2	0	2	2
Montana	2	18	0	3	1	2	0	1	0	1	3	25	28
Nebraska	0	1	0	1	0	0	0	2	0	5	0	9	9
Nevada	0	0	0	0	0	0	0	1	0	0	0	1	1
New Jersey	0	0	0	0	0	0	0	0	0	1	0	1	1
New Mexico	3	31	0	3	5	14	0	6	0	22	8	76	84
New York	0	19	0	0	0	0	0	1	0	4	0	24	24
North Dakota	0	0	0	1	0	0	0	0	0	1	0	2	2
Ohio	3	8	0	0	0	0	1	7	8	8	12	23	35
Oklahoma	13	112	17	77	0	0	7	119	0	9	37	317	354
Pennsylvania	1	8	0	0	0	3	0	1	0	0	1	12	13
South Dakota	0	1	0	0	0	0	0	1	0	1	0	3	3
Tennessee	0	10	0	0	0	0	0	0	6	39	6	49	55
Texas	110	838	66	311	69	225	2	71	11	100	258	1545	1803
Utah	2	7	0	0	0	1	0	3	0	0	2	11	13
Virginia	1	1	0	0	0	0	0	0	0	0	1	1	2
Washington	o	2	0	3	0	2	0	0	0	0	0	7	7
West Virginia	8	11	0	0	0	0	0	1	0	2	8	14	22
Wyoming	3	46	5	4	4	10	2	3	0	0	14	63	77
TOTALS	232	2039	124	595	99	400	12	372	34	389	501	3795	4296

* Including a few holes located on geochemistry.

TABLE IV

BASIS FOR LOCATING NEW-FIELD WILDCATS

(For *All* States Reported in United States)

	Geology		Geophysics		Geology & Geophysics*		Total Technical		Non-Technical		Unknown		Total		GRAND TOTAL
	Producers	Dry Holes	Producers	Dry Holes	Producers	Dry Holes	Producers	Dry Holes	Producers	Dry Holes	Producers	Dry Holes	Producers	Dry Holes	
1944	148	1328	108	589	40	177	296	2094	38	570	8	88	342	2752	3094
1945	180	1488	89	468	53	220	322	2176	17	302	13	207	352	2685	3037
1946	154	1584	91	413	57	211	302	2208	10	363	21	223	333	2794	3127
1947	200	1691	100	514	63	295	364	2500	15	389	15	197	394	3086	3480
1948	232	2039	124	595	99	400	455	3034	12	372	34	389	501	3795	4296

*Includes a few holes based on geochemistry.

TABLE V

FOOTAGE DRILLED IN NEW-FIELD WILDCATS

	Number of Producers	Number of Dry Holes	Total Producers & Dry Holes	Total Feet Drilled in Producers	Total Feet Drilled in Dry Holes	Total Feet Drilled in All New-Field Wildcats	Average Depth of New-Field Wildcats
1944	342	2,752	3,094	1,640,473	11,356,749	12,997,222	4,200
1945	352	2,685	3,037	1,789,392	11,579,385	13,368,777	4,402
1946	333	2,794	3,127	1,692,977	10,831,963	12,524,940	4,005
1947	394	3,086	3,480	2,096,864	12,520,723	14,617,587	4,200
1948	501	3,795	4,296	2,690,951	16,049,313	18,740,264	4,362

On the maps (Figs. 1 and 2), numbers in parentheses indicate total footage drilled; figures preceding parentheses indicate the number of holes drilled; figures above the cross line are for producing wells, that is, oil, oil and gas, condensate (distillate) and gas, and gas; and figures below the cross line are for dry holes.

In the states covered in this review, as shown in Figure 1, and listed in Table II, during 1948 a total of 32,741,097 feet was drilled in 8,013 exploratory holes, divided as follows.

	Feet
1,463 producers	7,179,450
6,550 dry holes	25,561,647

This means that 18.3 per cent of the holes drilled, and 21.9 per cent of the footage drilled, were successful in 1948. One producer foot was drilled for every 3.56 feet of dry hole. One successful well was drilled for every 4.50 dry holes. The average depth of hole was 4,086 feet.

In Table III are listed the reasons for drilling the new-field wildcats in 1948, by using the best information available from men familiar with such statistics, each in his own state or district. According to these figures 455 new-field wildcats drilled on technical advice (geology and/or geophysics) were successful, and 3,034 were dry; 12 holes, located for non-technical reasons, were producers, and 372 were dry; 34 producers and 389 dry holes were located for reasons unknown. These figures show that 13.0 per cent of the holes drilled on technical advice were producers as contrasted to 3.1 per cent successful in the case of the holes located without technical advice. Therefore, in 1948, locations for new-field wildcats based on technical recommendations were 4.1 times as successful as those drilled without such advice. Seismographic methods were primarily responsible for 219 producers and 948 dry holes, among the new-field wildcats.

For this year's report the committee voted to include statistics on the basis of location only for new-field wildcats (rank wildcats). In previous years such data have been presented for all five categories of exploratory wells, and also for new-field wildcats separately. To facilitate comparison between 1948 and the four preceding years, for which the corresponding data are available, we have prepared Table IV.

Table V presents data on the footage drilled in new-field wildcats in the years 1944 to 1948, inclusive.

Table VI gives a breakdown, by classes, of the exploratory holes drilled in 1948 in the United States. Each class is shown separately, both producers and dry holes, and the three types of new-pool tests are grouped together in Column 5. This table is to be compared with Tables VI to IX, inclusive, in last year's printed report.[5]

[5] "Exploratory Drilling in 1947," by F. H. Lahee, *Bull. Amer. Assoc. Petrol. Geol.*, Vol. 32, No. 6 (June, 1948), pp. 860–63.

TABLE VI

Number of Exploratory Holes Drilled in United States in 1948, by Classes and States

State	1 Outposts		New-Pool Tests: 2 New-Pool Wildcats		3 Deeper-Pool Tests		4 Shallower-Pool Tests		5 (2+3+4) Total New-Pool Tests		6 New-Field Wildcats		Total Exploratory Holes: 7 (1+5+6) Total		8 Grand Total
	Prod.	Dry	Prod.	Dry	Prod.	Dry	Prod.	Dry	Prod.	Dry	Prod.	Dry	Prod.	Dry	
Alabama	0	0	0	0	0	0	0	0	0	0	0	19	0	19	19
Arizona	0	0	0	0	0	0	0	0	0	0	0	4	0	4	4
Arkansas	6	0	1	10	0	0	0	0	1	10	4	97	11	107	118
California	34	64	20	103	8	24	1	2	29	129	18	214	81	407	488
Colorado	6	0	0	0	0	6	0	0	0	6	4	37	10	43	53
Florida	1	0	0	0	0	0	0	0	0	0	0	21	1	21	22
Georgia	0	0	0	0	0	0	0	0	0	0	0	3	0	3	3
Illinois	42	300	5	50	4	56	0	6	9	112	28	204	79	616	695
Indiana	4	26	13	37	3	5	0	0	16	42	20	195	40	263	303
Kansas	24	81	60	251	0	3	2	0	62	254	14	179	100	514	614
Kentucky	13	10	10	54	6	12	2	1	18	67	11	105	42	182	224
Louisiana	43	91	31	27	15	9	4	0	50	36	35	193	128	320	448
Maryland	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
Michigan	8	28	0	8	1	7	3	0	4	15	14	241	26	284	310
Mississippi	3	7	2	6	1	3	0	0	3	9	3	97	9	113	122
Missouri	0	0	0	0	0	0	0	0	0	0	0	2	0	2	2
Montana	10	15	1	0	0	3	0	0	1	3	3	25	14	43	57
Nebraska	0	0	0	0	0	0	0	0	0	0	0	9	0	9	9
Nevada	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
New Jersey	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
New Mexico	11	7	2	3	3	3	0	0	5	6	8	76	24	89	113
New York	1	2	0	5	0	0	0	0	0	5	0	24	1	31	32
North Dakota	0	0	0	0	0	0	0	0	0	0	0	2	0	2	2
Ohio	6	8	8	13	0	3	1	0	9	16	12	23	27	47	74
Oklahoma	53	152	49	166	5	5	3	6	57	177	37	317	147	646	793
Pennsylvania	14	24	5	31	0	2	1	0	6	33	1	12	21	69	90
South Dakota	0	0	0	0	0	0	0	0	0	0	0	3	0	3	3
Tennessee	6	6	0	0	0	0	0	0	0	0	6	49	12	55	67
Texas	189	419	107	373	56	165	9	4	172	542	258	1545	619	2506	3125
Utah	1	0	0	0	1	1	1	0	2	1	2	11	5	12	17
Virginia	0	0	0	1	0	0	0	0	0	1	1	1	1	2	3
Washington	0	0	0	0	0	0	0	0	0	0	0	7	0	7	7
West Virginia	4	3	8	5	1	3	0	0	9	8	8	14	21	25	46
Wyoming	11	33	3	1	13	6	3	0	19	7	14	63	44	103	147
Totals	490	1276	325	1144	117	316	30	19	472	1479	501	3795	1463	6550	8013

In Table VII is shown a percentage analysis of the exploratory drilling in 1948 and also in 1946 and 1947. Again, in 1948, the percentage of new-field wildcatting, in the entire exploratory drilling program, was very near 54 per cent. That for new-pool testing was just over 25 per cent, and that for outpost drilling was just under 22 per cent.

In Table VIII are listed comparative data from 1938 to 1948, inclusive. Tables VI, VII, and VIII include data from all states from which information was received, without special reference to the "17-states area" (Figure 3).[6] As far as possible this year we are covering the entire United States in our tables and statements. Only in the case of Table XII are the data limited to the 17 selected states.

In Table IX are listed annual statistics comparing the American Petroleum Institute's figures on proved oil reserves[7] with our figures on exploratory drilling. This comparison is suggestive, but it is not quite precise, and for this reason, the estimated "new proved reserves" (columns C and E) include, for each year, newly discovered proved reserves and also new proved reserves resulting from extensions of pools or fields previously discovered.[8] This new oil by extensions is very largely a result of regular field development, not of exploratory drilling. In fact, some study of this matter leads us to conclude that probably not more than 2 per cent—certainly not more than 5 per cent—of the new proved reserves added by extensions in any given year is attributable to exploratory drilling. It is nearly all to be credited to field-development drilling. However, this "extension oil," each year, is really a follow-up of the discoveries of several preceding years. In this sense certain fractions of it might be credited to years gone by, but this would involve many serious difficulties. We believe that it is better to refer to the simpler picture as presented in Table IX, keeping in mind that columns G and I do not actually measure the results of the exploratory effort for any given year. If a somewhat closer analysis is sought, an approach to the problem can be made similar to that illustrated in Table V, on page 1589 of our "Review."[9]

Observe that Table IX covers the United States, and not only the 17-states area of earlier reports in the analogous table.

As indicated in Table I, a hole may be located as an outpost with the intention of trying to extend a pool partly developed, but instead it may discover a new

[6] As shown in Figure 3, the 17 states (often treated as a group in previous reports, for the reasons that (1) exploratory data were available from them for a continuous period of several years, and (2) they embraced a large percentage of all the exploratory drilling in the United States) included Alabama, Arkansas, California, Colorado, Illinois, Indiana, Kansas, Kentucky, Louisiana, Michigan, Mississippi, Montana, Nebraska, New Mexico, Oklahoma, Texas, and Wyoming.

[7] We have taken totals of the reserves figures published by the A.P.I. each year. For December 31, 1946, we have used reserves figures analogous to those used in the earlier years. For 1947 and 1948, we have used the A.P.I.'s figures for total liquid hydrocarbons, i.e., crude oil plus natural-gas liquids.

[8] We need not concern ourselves here with revisions due to correction of factors used in making the reserve estimates.

[9] "Review of Exploratory Drilling Statistics, 1938–1944," *Bull. Amer. Assoc. Petrol. Geol.*, Vol. 29, No. 11 (November, 1945), pp. 1581–92.

TABLE VII

PERCENTAGE OF EXPLORATORY HOLES DRILLED IN EACH CLASS IN UNITED STATES IN 1946, 1947, AND 1948

		1946			1947			1948		
		Number	Well Per Cent	Class Per Cent	Number	Well Per Cent	Class Per Cent	Number	Well Per Cent	Class Per Cent
	Producers	482	34.06		489	31.71		490	27.74	
	Dry Holes	933	65.94		1,053	68.29		1,276	72.26	
OUTPOSTS	Totals	1,415	100.00	24.60	1,542	100.00	22.76	1,766	100.00	22.04
	Producers	213	26.39		324	26.64		325	22.12	
NEW-POOL	Dry Holes	579	73.11		892	73.36		1,144	77.88	
WILDCATS	Totals	792	100.00	13.77	1,216	100.00	17.95	1,469	100.00	18.33
	Producers	85	21.79		145	29.06		117	27.02	
DEEPER-POOL	Dry Holes	305	78.21		354	70.95		316	72.98	
TESTS	Totals	390	100.00	6.78	499	100.00	7.37	433	100.00	5.40
	Producers	24	82.76		26	68.42		30	58.82	
SHALLOWER-POOL	Dry Holes	5	17.24		12	31.58		19	41.18	
TESTS	Totals	29	100.00	.50	38	100.00	.56	49	100.00	.61
	Producers	333	10.65		394	11.32		501	11.66	
NEW-FIELD	Dry Holes	2,794	89.35		3,086	88.68		3,795	88.34	
WILDCATS	Totals	3,127	100.00	54.35	3,480	100.00	51.36	4,296	100.00	53.62
Total Producers		1,137	19.76		1,378	20.34		1,463	18.25	
Total Dry Holes		4,616	80.24		5,397	79.56		6,550	81.75	
Grand Totals		5,753	100.00	100.00	6,775	100.00	100.00	8,013	100.00	100.00

TABLE VIII

Statistics on Exploratory Holes and Footage Drilled, and on Average Depth of Exploratory Hole in United States

	A		B	C	D	E	F	G	H	I	J	K
	Successful Exploratory Wells											
Year	Total Producers*		New-Field Discovery Wells	B is What % of A	Number of Dry Exploratory Holes	Total Exploratory Holes A + D	Number of Dry Exploratory Holes Drilled For Each Producer (D/A)	Total Footage in Successful Exploratory Holes	Total Footage in Dry Exploratory Holes	Number of Feet Drilled in Dry Holes for Each Foot in Producers (H/G)	Total Exploratory Footage (G + H)	Average Depth of Exploratory Hole (J/E)
1938	294 oil 75 gas	369	226	61.2	2,269	2,638	6.14	1,526,557	7,333,927	4.8	8,860,484	3,359
° 1939	226 oil 49 gas	275	175	63.6	2,427	2,702	8.81	1,118,420	7,674,677	6.86	8,793,097	3,331
1940	302 oil 64 gas	366	241	65.8	2,672	3,038	7.30	1,411,550	8,842,418	6.26	10,253,948	3,375
1941	416 oil 60 gas 27 cond.	503	282	56.1	2,761	3,264	5.48	2,047,377	9,567,708	4.66	11,615,085	3,559
1942	410 oil 53 gas 29 cond.	492	268	54.5	2,720	3,212	5.52	2,158,707	9,965,287	4.62	12,123,994	3,775
°° 1943	530 oil 147 gas 37 cond.	714	400	56.0	3,294	4,008	4.61	2,158,707	12,783,447	4.35	15,719,713	3,922
1944	709 oil 149 gas 86 cond	944	342	36.2	3,852	4,796	4.08	4,382,220	15,843,667	3.61	20,225,887	4,217
1945	840 oil 274 gas 100 cond	1214	352	29.0	4,399	5,613	3.62	5,501,702	17,528,564	3.19	23,030,266	4,103
1946	762 oil 272 gas 103 cond.	1137	333	29.3	4,616	5,753	4.06	5,286,711	16,880,850	3.19	22,167,561	3,854
1947	981 oil 325 gas 72 cond.	1378	394	28.6	5,397	6,775	3.90	6,166,163	20,227,185	3.28	26,393,348	3,896
1948	1098 oil 255 gas 110 cond.	1453	501	34.2	6,550	8,013	4.5	7,179,450	25,561,647	3.56	32,741,097	4,086

* In the years 1938 to 1940 inclusive, condensate-plus-gas wells are included with gas wells. After 1940 gas wells and condensate-plus-gas wells are listed separately in this table.
° Kentucky statistics were added for 1939 after publication of that year's report.
°° Statistics for New York, Pennsylvania, and Eastern Ohio have been included here in 1943, although they came in too late for publication in the 1943 report.

TABLE IX

Summary of Statistics on Proved Reserves and Exploratory Drilling in United States

Year	A	B	C	D	E	F	G	H	I
	Proved Oil Reserves as of Jan. 1 (1,000's of Bbls.)	Proved Oil Reserves as of Dec. 31 (1,000's of Bbls.)	Net New Proved Oil Reserves (1,000's of Bbls.) (B-A)	Oil Production During Year (1,000's of Bbls.)	Gross New Proved Oil Reserves (C + D) (1,000's of Bbls.)	Total Exploratory Footage (Feet)	New Proved Oil Reserves (E) Per Exploratory Foot Drilled (Bbls.) E/F	Total Number of Exploratory Holes Drilled	New Proved Oil Reserves (E) Per Exploratory Hole Drilled (Bbls.) E/H
1938	15,507,268	17,348,146	1,840,878	1,213,186	3,054,064	8,860,484	344.7	2,638	1,157,719
1939	17,348,146	18,483,012	1,134,866	1,264,256	2,399,122	8,793,097	272.8	2,702	887,906
1940	18,483,012	19,024,515	541,503	1,351,847	1,893,350	10,253,948	184.6	3,038	623,223
1941	19,024,515	19,589,296	564,781	1,404,182	1,968,963	11,615,085	169.5	3,264	603,236
1942	19,589,296	20,082,793	493,497	1,385,479	1,878,976	12,123,994	155.0	3,212	584,986
1943	20,082,793	20,064,152	(-)18,641	1,503,427	1,484,786	15,719,713	94.5	4,008	370,458
1944	20,064,152	20,453,231	389,079	1,678,421	2,067,500	20,225,887	102.2	4,796	431,088
1945	20,453,231	20,826,813	373,582	1,736,717	2,110,299	23,030,266	91.6	5,613	375,966
1946	20,826,813	24,036,779*	3,209,966*	1,855,610*	5,065,576*	22,167,561	228.5	5,753	880,510
	Proved Liquid Hydrocarbon Reserves as of Jan. 1 (1,000's of Bbls.)	Proved Liquid Hydrocarbon Reserves as of Dec. 31 (1,000's of Bbls.)	Net New Proved Liquid hydrocarbon Reserves Found During Year (1,000's of Bbls.)	Liquid Hydrocarbon Production During Year (1,000's of Bbls.)	Proved Gross New Liquid Hydrocarbon Reserves (C + D) (1,000's of Bbls.)	Total Exploratory Footage Drilled During Year (Feet)	New Proved Liquid Hydrocarbon Reserves (E) Per Exploratory Foot Drilled (Bbls.) E/F	Total Number of Exploratory Holes Drilled During Year	New Proved Liquid Hydrocarbon Reserves (E) Per Exploratory Hole Drilled (Bbls.) E/H
1947	24,036,779	24,741,660	704,881	2,011,227	2,716,108	26,393,348	102.5	6,775	400,902
1948	24,741,660	26,821,227	2,079,567	2,186,197	4,265,764	32,741,097	130.3	8,013	532,855

*Under 1946, B, C, D, and E, and in all figures (A,B,C,D,E) in 1947 and 1948, both crude oil proved reserves (API Committee) and natural gas liquids proved reserves (American Gas Assoc. Committee) are included. Previous to 1946, not all natural gas liquids proved reserves were included in these estimates. Consequently the figures in Columns G and I for 1946 are not comparable with other figures in the columns either before or after 1946.

pool; and, similarly, a new-pool wildcat may be located in search of a new pool because it is believed to be well outside the limits of the known pool, but instead it may result in extending this known pool farther than had been expected. A majority of outposts, if successful, are completed as extension wells and a majority of new-pool wildcats, if successful, discover new pools. To show the class distribution of these completions in 1948, we prepared Table X. Here we see that 418 outposts were completed as extension wells and 72 were completed as new-pool discoveries; and 288 new-pool wildcats discovered new pools whereas 37 new-pool wildcats were completed as extension wells.[10]

A question sometimes asked concerns the approximate percentage of true wildcatting (new-field wildcatting) by major companies, on the one hand, and by minor companies and independents, on the other hand. Distinction between these three classes of operator is not always easy, and in some instances the

TABLE X

NEW-POOL DISCOVERIES AND EXTENSIONS OF OLDER POOLS IN UNITED STATES IN 1948

	New Pools Discovered in 1948					*Extensions of Old Pools*		
	By Outposts	*By New-Pool Wildcats*	*By Deeper Pool Tests*	*By Shallower Pool Tests*	*Total New Pools Discovered in 1948*	*By Outposts*	*By New-Pool Wildcats*	*Total Extensions in 1948*
Oil	56	209	89	25	379	323	30	353
Gas	12	53	17	5	87	64	7	71
Condensate	4	26	11	0	41	31	0	31
Total	72	288	117	30	507	418	37	455

same company may be regarded as a "major" in one district, but as a "minor" in another district. Consequently we left the classification to the judgement of the various committeemen, each for his own district. Usually a major company is defined as one which is integrated with respect to at least three of the four main branches of production, transportation, refining, and marketing.

Our statistics showed that in the country as a whole, 948 new-field wildcats (182 producers and 766 dry holes) were drilled by majors; 2,941 new-field wildcats (280 producers and 2,661 dry holes) were drilled by minors and independents; and 407 new-field wildcats (39 producers and 368 dry holes) were drilled by minors or independents with the drilling financed by major companies.

In our "Review of Exploratory Drilling Statistics," already cited, on pages 1590 and 1591, and in Table VI of that article, we compared estimates of total ultimate reserves of the fields discovered in the 17-states area (Fig. 3) in the years 1938 to 1943, inclusive, these *estimates* being made, not at the time of discovery, but all of them as of January 1, 1945. Since the fields in 1943 were the

[10] The new-pool discoveries referred to in this paper are all the result of exploratory drilling. In addition to these, at least 125 new pools were discovered in the drilling of field-development wells. These included 27 discoveries of gas, 85 of oil, and 13 of condensate.

TABLE XI

NUMBER OF FIELDS DISCOVERED EACH YEAR, FROM 1938 TO 1947, INCLUSIVE, IN 17-STATES AREA, GROUPED ACCORDING TO TOTAL ULTIMATE RESERVES AS ESTIMATED ON DECEMBER 31, 1948

Year of Discovery	Reserves Groups*						Total	A + B + C	Percentage
	A	B	C	D	E	F	A to F, Inclusive	Fields	A + B + C Fields in Total Fields
	Number of Fields Discovered in Year Indicated								
1938	14	8	23	58	91	33	227	45	19.8
1939	6	1	14	48	65	25	159	21	13.2
1940	5	11	16	49	118	24	223	32	14.3
1941	5	5	15	73	144	33	275	25	9.1
1942	0	5	9	55	155	31	255	14	5.5
1943	2	4	13	63	201	26	309	19	6.1
1944	4	1	9	62	152	17	245	14	5.7
1945	2	2	9	42	173	24	252	13	5.2
1946	1	3	3	49	148	21	225	7	3.1
1947	0	6	8	47	212	18	291	14	4.8

* In these estimates of total ultimate reserves, made as of December 31, 1948 (January 1, 1949),
A: 50 million or more barrels
B: between 25 million and 50 million barrels
C: between 10 million and 25 million barrels
D: between 1 million and 10 million barrels
E: less than 1 million barrels
F: abandoned

latest considered in that study, all of them had at least a year of development history on January 1, 1945, to help toward a reasonably fair estimate. The older fields had a correspondingly longer period of development history to serve as a guide. In making the estimates the reserves of pools subsequently discovered on a producing structure were all added to the reserves of the first pool discovered on that structure, and the total of these pool reserves was assigned to the year of discovery of the first pool. No fields were included in the study except those of which the first pool was discovered within the 6-year period (1938–1943).

In accordance with our suggestion made in the "Review," our committee has made a re-appraisal of the fields discovered in those six years in the 17-states area, and has added estimates of the total ultimate reserves for the new-field discoveries of 1944, 1945, 1946, and 1947, in the same area. Table XI presents these estimates which were made as of January 1, 1949. As a result of the re-appraisal several fields were dropped from the list either because they were gas fields or because they were abandoned. A few gas fields which began to produce oil were added to the list. Those fields which have been abandoned are designated "F." Fields with total ultimate reserves of 50 million barrels, or more, are designated "A"; those with total ultimate reserves of between 25 and 50 million barrels are called "B"; between 10 million and 25 million barrels, "C"; between 1 million and 10 million barrels, "D"; and with less than 1 million barrels, "E." These figures all refer to the reserves estimated to have been originally present in the field before any oil was produced.

In the re-appraisal of January 1, 1949, 3 A-fields were lowered to "B." 4 B-fields were raised to "A"; 3 B-fields were lowered to "C"; 12 C-fields were raised, one to "A" and 11 to "B"; 11 C-fields were lowered, 10 to "D" and 1 to "E"; 19 D-fields were raised to "C"; 45 D-fields were lowered to "E"; 69 E-fields were raised, one to "C" and 68 to "D"; and 61 E-fields were lowered, i.e., abandoned. Seven abandoned fields were apparently revived and assigned a classification of "E." In all, then, in 111 fields the rating was raised, and in 123 it was lowered, and 61 of these 123 were abandonments. Most of the raises come in the "D's" and "E's" which are fields in which the reserves have been too conservatively estimated or fields in which new pools have been discovered since the earlier ratings were applied. If we add together the A-fields, B-fields, and C-fields for each year, that is, all fields having total ultimate reserves of 10 million barrels or more, and find the percentage of these totals in the whole group of fields (A to E inclusive) for each year, we observe a more or less regularly decreasing percentage (see last column in Table XI).

In conclusion with reference to exploratory drilling in the United States, comparing 1948 figures with those of 1947, we note the following.

1. In number of exploratory holes drilled there was an increase of 18.2 per cent, and in exploratory footage drilled there was an increase of 24.1 per cent. The increases in 1948 over 1946, based on 1946 figures, were 39.3 per cent in holes drilled and 47.6 per cent in footage.

TABLE XII

EXPLORATORY DRILLING IN WESTERN CANADA IN 1948

Province	Well Classification	Oil		Gas		Condensate		Total Producers		Dry		Grand Total	
		Number	Footage	Number	Footage	Number	Footage	Number	Footage	Number	Footage	Number	Footage
Alberta	New-Field Wildcats	8	29,682	6	27,337	1	12,516	15	69,535	99	416,386	114	485,921
	Outposts	10	31,317	5	10,947	0	0	15	42,264	10	45,760	25	88,024
	New-Pool Wildcats	2	7,586	0	0	0	0	2	7,586	6	26,471	8	34,057
	Deeper-Pool Tests	1	2,143	0	0	0	0	1	2,143	1	1,403	2	3,546
	Shallower-Pool Tests	0	0	0	0	0	0	0	0	0	0	0	0
Saskatchewan	New-Field Wildcats	4	8,637	0	0	0	0	4	8,637	13	31,904	17	40,541
	Outposts	1	1,894	0	0	0	0	1	1,894	3	5,794	4	7,688
	New-Pool Wildcats	0	0	0	0	0	0	0	0	2	4,101	2	4,101
	Deeper-Pool Tests	0	0	0	0	0	0	0	0	0	0	0	0
	Shallower-Pool Tests	0	0	0	0	0	0	0	0	0	0	0	0
Totals		26	81,259	11	38,284	1	12,516	38	132,059	134	531,819	172	665,878

2. Considering only the new-field wildcats, 1948 witnessed an increase of 23.4 per cent in holes drilled and an increase of 28.2 per cent in footage drilled, compared with 1947. Compared with 1946, the corresponding 1948 increases were 37.4 and 49.6 per cent respectively.

3. In many of the states there were large increases in exploratory drilling in 1948, contrasted with 1947, but there was a decrease in Florida, Georgia, Ohio, Oklahoma, and Pennsylvania.

4. The average depth of hole for all exploratory drilling increased from 3,896 feet in 1947 to 4,086 feet in 1948.

Exploratory Drilling in Canada

Statistics on exploratory drilling in western Canada were compiled by F. K. Beach, assisted by John Gray, W. P. Hancock, and J. Porter. This is the first

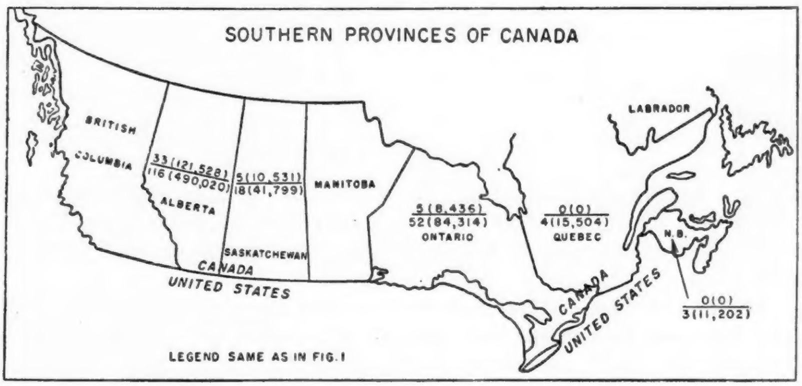

Fig. 4

time that we have received Canadian statistics for this annual report. We look forward to a similar yearly contribution which will give opportunity for periodic consideration of this important phase of the oil and gas industries.

In western Canada last year 172 exploratory holes were completed, all of these being within the two provinces, Saskatchewan and Alberta (Table XII). These 172 holes included 38 producers (26 oil, 11 gas, and 1 condensate) and 134 dry holes. A total of 663,878 feet was drilled, 132,059 feet in the producers and 531,819 feet in the dry holes. This means that 22.1 per cent of the exploratory holes and 19.8 per cent of the exploratory footage were successful. Four (4.0) feet were drilled in dry holes for every foot drilled in producers. The average depth was 3,859 feet.

Among the 131 new-field wildcats completed in 1948, 19 were successful and

112 were dry. In other words, new-field wildcatting was 14.5 per cent successful. One producer was drilled for every 5.89 dry holes. Seventy-seven of the new-field wildcats (9 producers and 68 dry) were drilled by independents. One dry hole is reported to have been drilled by an independent, but financed by a major. The bases for location of the 131 new-field wildcats are shown in Table XIII.

In eastern Canada, 64 exploratory holes were drilled, with a total of 119,456 feet. Five of the 64 holes were successful, 3 as gas wells and 2 as oil wells, all of these being in southwestern Ontario. In these producers, 8,436 feet were drilled. In addition to the 59 dry holes, 7 other dry exploratory holes were drilled, but since the footage was not reported, we are not including these in arriving at percentages. Referring only to the 64 holes, 7.8 per cent were successful. Seven per cent of the exploratory footage was in successful holes. For every foot drilled in producers, 14.16 feet were drilled in dry holes. The average depth of hole was 1,866.5 feet.

TABLE XIII

BASIS FOR LOCATION OF WESTERN CANADIAN NEW-FIELD WILDCATS

	Geology	*Geo-physics*	*Geology and Geophysics*	*Total Technical*	*Non-Technical*	*Unknown*	*Total*
Producers	10	5	2	17	2	0	19
Dry Holes	31	36	9	76	9	27	112
Total	41	41	11	93	11	27	131

All but 3 of these exploratory holes in eastern Canada were new-field wildcats. The three were deeper-pool tests, all dry. Among the new-field wildcats (including the 7 with unreported depth), 50 were drilled by major companies and 18 by minors or independents. With reference to the basis of location, 56 new-field wildcats were located on subsurface geology, 4 on surface geology, 2 on seismology, and 6 for reasons unknown.

The distribution of the 71 holes was as follows.

Southwestern Ontario	
	5 new-field wildcat producers
	56 dry new-field wildcats
	3 dry deeper-pool tests
Quebec (St. Lawrence Lowlands)	
	1 dry new-field wildcat
Quebec (Gaspe):	3 dry new-field wildcats
New Brunswick:	3 dry new-field wildcats
Total:	71 exploratory holes

EXPLORATORY DRILLING IN MEXICO

All exploratory drilling in Mexico was accomplished through the governmental organization, Petroleos Mexicanos. Data on the 1948 exploratory pro-

TABLE XIV
EXPLORATORY DRILLING IN MEXICO IN 1948

State	Well Classification	Producers						Dry		Grand Total	
		Oil		Condensate		Total					
		Number	Footage	Number	Footage	Number	Footage	Number	Footage	Number	Footage
Chihuahua	New-Field Wildcats	0	0	0	0	0	0	1	8,515	1	8,515
Puebla	New-Field Wildcats	0	0	0	0	0	0	1	4,140	1	4,140
San Luis Potosi	New-Pool Wildcats	1	2,162	0	0	1	2,162	4	12,325	5	14,487
Tabasco	New-Field Wildcats	0	0	1	4,024	1	4,024	2	12,788	3	16,812
Tamaulipas	New-Field Wildcats	1	8,114	1	6,228	2	14,342	2	20,152	4	34,494
	Shallower-Pool Tests	1	4,642	0	0	1	4,642	0	0	1	4,642
Veracruz	New-Field Wildcats	2	7,433	0	0	2	7,433	9	72,357	11	79,790
	New-Pool Wildcats	2	6,205	0	0	2	6,205	1	2,044	3	8,249
	Deeper-Pool Tests	0	0	0	0	0	0	1	2,858	1	2,858
Totals		7	28,556	2	10,252	9	38,808	21	135,179	30	173,987

gram were kindly provided for this report by Ing. Manuel Rodriguez Aguilar. These data are listed in Table XIV. A total of 30 exploratory holes were drilled, with a total of 173,987 feet. Of these holes, 9 (7 oil wells and 2 condensate producers) were successful, these 9 holes having a total of 38,808 feet. According to these figures, this exploratory program was 33.3 per cent successful. For each producer foot, 4.5 feet were drilled in dry holes. The average depth of all 30 holes was 5,800 feet.

Twenty of the 30 holes were new-field wildcats, and 5 of these, or 25 per cent were successful. All were drilled on a technical basis as follows.

2 producers and 6 dry holes were located on geology
2 producers and 9 dry holes were located on geophysics
1 producer was located on both geology and geophysics

Conclusion

There is no need here to summarize the figures and comparisons already made in the foregoing text. They may be useful in various ways. We call attention, as we did in former years, to their value in measuring company success. For instance, a company can compare the percentage of its own success in exploratory drilling with the industry's results in the same state or district. Or, again, figures which are far from the average call for an explanation. Why, for example, were there only three successful wells out of a total of 100 new-field wildcats drilled in Mississippi last year?

Beyond possible interest in the statistics herewith presented, we geologists should be impressed with the greatness of the opportunity which so many exploratory holes, and particularly so many new-field wildcats, offer for building up our knowledge of subsurface geology. Above all we should emphatically and persistently stress the fact—to our production departments and to our executives—that dry wildcats are not financial failures if they reveal significant geological data, for from these data conclusions may often be drawn which will lead to the discovery of oil or gas in subsequent drilling. It is for this reason that each such hole should be thoroughly explored, by sampling, by logging, by every available technical method that may teach us something of value, and this even though these operations may add considerably to the cost. Especially, we want to urge realization of the great importance of the thesis of Paul Weaver's presidential address,[11] that we should learn, in as many ways as possible, how to interpret the samples obtainable from a *single* wildcat well, a well so far from other wells that its correlation with them can be only very general. Every new-field wildcat should be made to yield the utmost of geological and geophysical information.

[11] To be published in *Bull. Amer. Assoc. Petrol. Geol.*, Vol. 33, No. 7 (July, 1949).

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VOL. 33, NO. 6 (JUNE, 1949), PP. 805-826, 4 FIGS., 7 TABLES

DEVELOPMENTS IN CALIFORNIA IN 1948[1]

GRAHAM B. MOODY[2]
San Francisco, California

ABSTRACT

Total exploratory footage in 488 exploratory wells completed as producers or abandoned as dry holes in 1948 was 2,005,366 feet. Comparable figures for 1947: 352 wells and 1,571,257 feet. Exploratory activity during 1948 was greater by 38.6 per cent as to number of wells and 27.6 per cent as to footage than in 1947. Exploratory wells were 16.6 per cent and 15.6 per cent successful as to number and footage, respectively. They discovered a total of 49 new fields and new pools, of which 9 were gas and 40 were oil. The most promising of the oil discoveries were the Russell Ranch field in Cuyama Valley, the Guijarral Hills field in the Coalinga area, and the Campbell pool in the San Ardo field in the Salinas Valley. Several oil fields were extended substantially. None of the new gas fields and pools can be rated as a major discovery. New fields, new pools, and extensions added 151,000,000 barrels to oil reserves, 8,000,000 barrels to natural-gas liquids reserves, and 240,000,000 MCF to gas reserves. Production during the year was about 340,069,000 barrels of crude oil, 189,933,000 MCF of gas from dry gas fields, 421,200,000 MCF of wet gas from oil fields, and 26,480,000 barrels of natural gas liquids (including condensate). Basement was reached by 57 unsuccessful exploratory wells at depths varying from about 205 to 10,300 feet. There were 64 exploratory wells active at the end of 1948.

INTRODUCTION

This article may be considered as a report by the California subcommittee on statistics of exploratory drilling. The 1948 members of this subcommittee were: F. B. Carter, D. Davis, T. J. Fitzgerald, J. B. O'Flynn, H. E. Rader, R. L. Rist, A. J. Solari, and the writer as chairman. The committee classifies each exploratory well, in accordance with F. H. Lahee's[3] classification, and determines the basis for locating the hole when it is first reported. The writer expresses his sincere thanks to each member of the committee for the critical consideration accorded by them to every exploratory well.

EXPLORATION

Exploratory effort attained a new high in 1948 with 488 wells and 2,005,366 feet of exploratory hole. This was 38.6 per cent greater for number of wells and 27.6 per cent greater for footage than in 1947.

The locations of exploratory holes relative to previously producing areas are shown in Figures 1, 2, 2-A, and 2-B. The last two are enlargements of the most active areas of Figure 2. One very active area, San Ardo in the Salinas Valley, lies outside the limits of Figure 2-A and is shown only on Figure 2. The small numbers attached to abandoned holes or successful wells indicate the total number of holes represented by the well symbol in areas where the scale of the map precludes clearly showing all holes separately. The large numbers attached to successful wells refer to correspondingly numbered wells in Tables IV, V, and

[1] Manuscript received, March 13, 1949.

[2] Standard Oil Company of California. The writer expresses his thanks to M. Bigelow for compiling the tables and to D. J. Christensen, J. H. Harvey, D. H. Lewis, and P. Tourjee for preparing the figures for publication.

[3] Frederic H. Lahee, "Exploratory Drilling in 1944," *Bull. Amer. Assoc. Petrol. Geol.*, Vol. 29, No. 6 (June, 1945), p. 630.

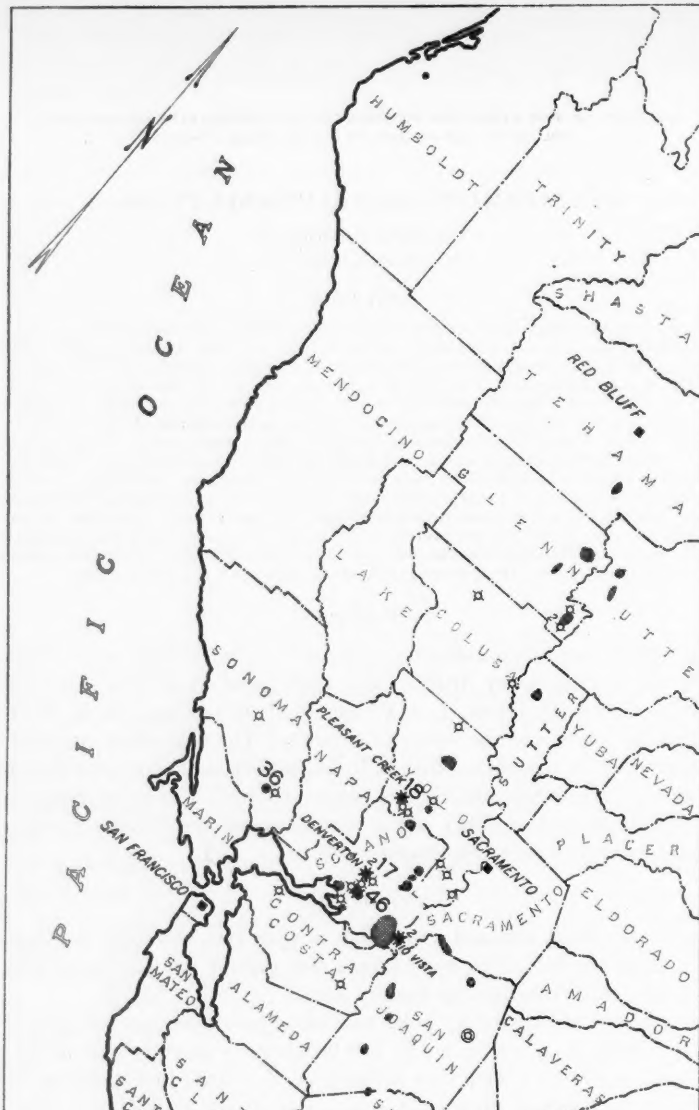


FIG. 1.—Locations of 1948 exploratory wells in north half of California. See Figure 2-A for explanation of symbols.

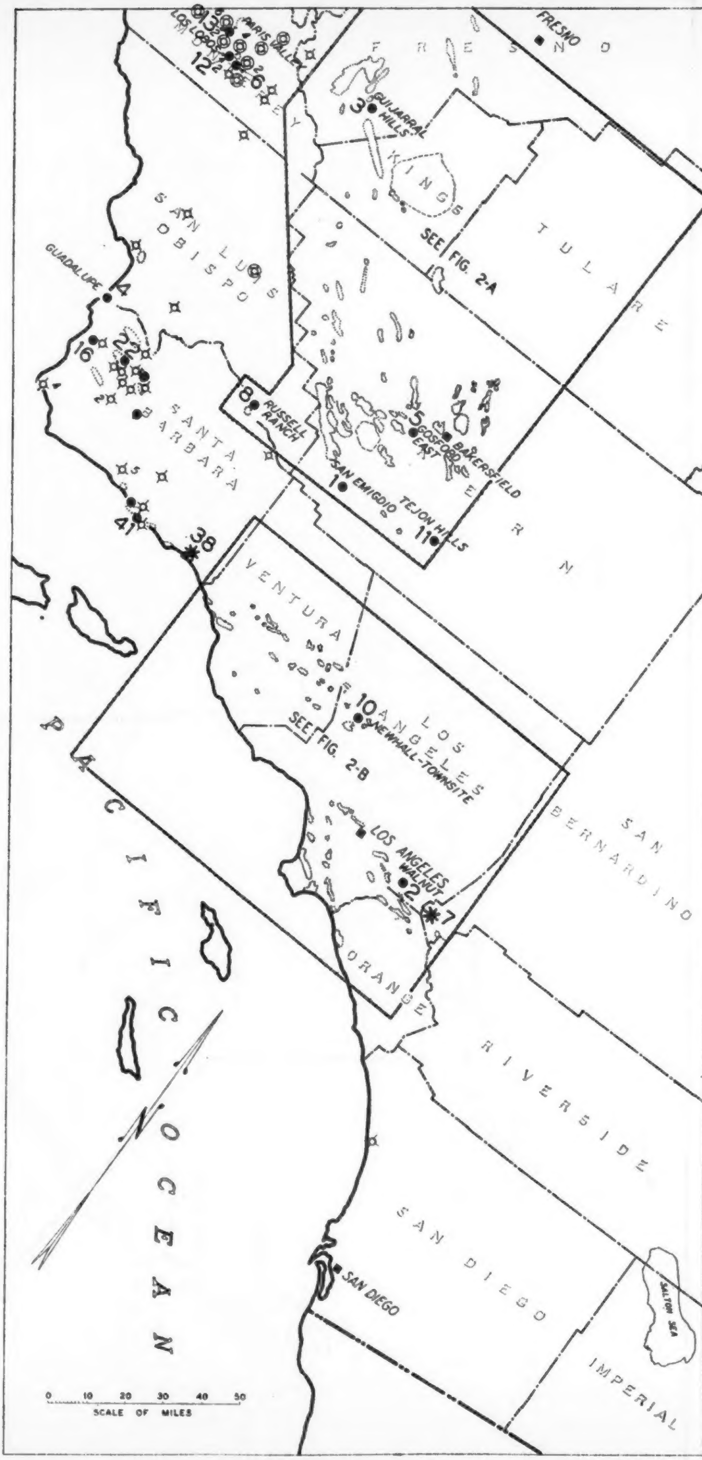
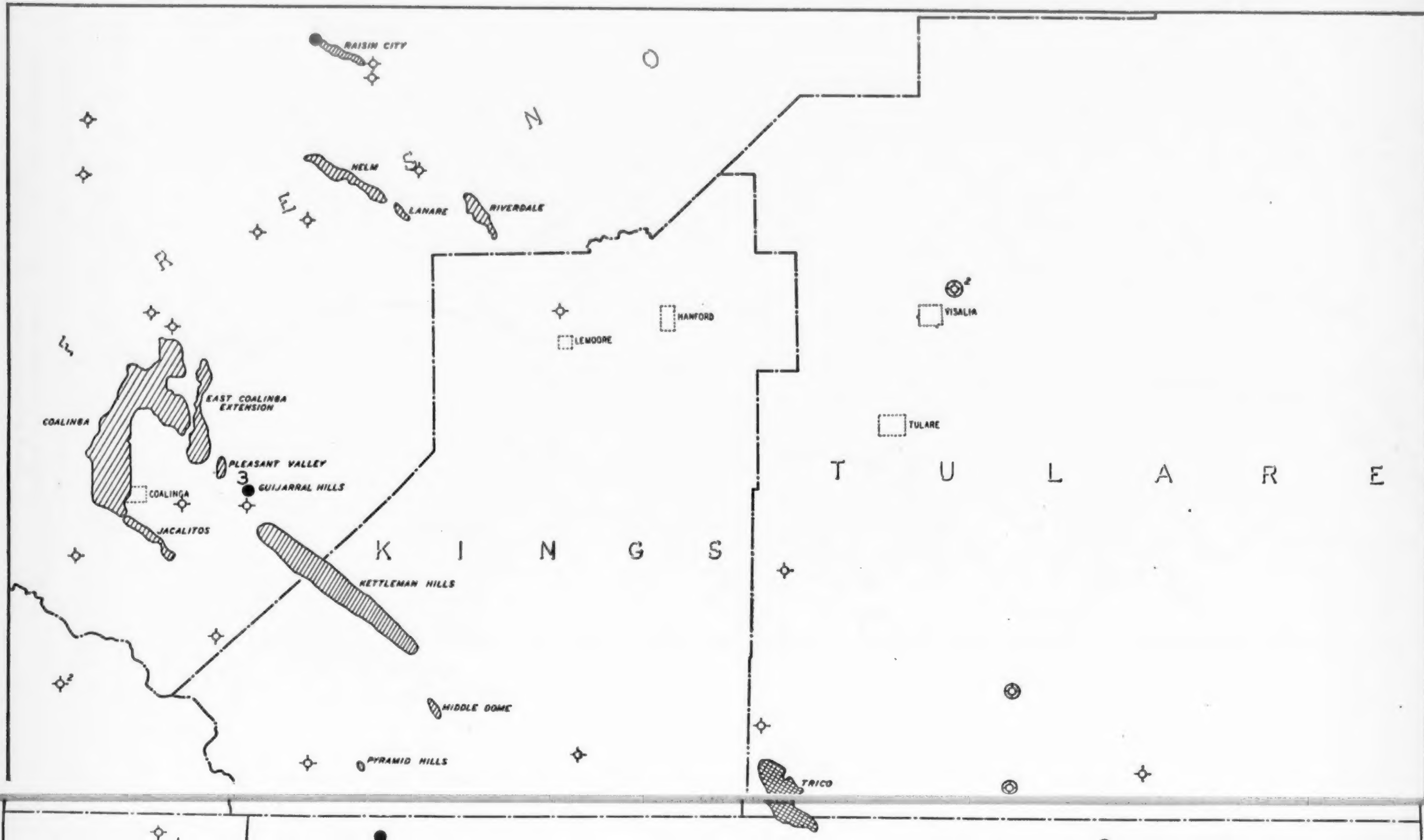


FIG. 2.—Locations of 1948 exploratory wells in south half of California. See Figure 2-A for explanation of symbols.



F R E S N O
K I N G S
T U L A R E
RAISIN CITY
HELM
LANARE
RIVERDALE
COALINGA
EAST COALINGA EXTENSION
PLEASANT VALLEY
3
GUIJARRAL HILLS
COALINGA
JACALITOS
KETTLEMAN HILLS
MIDDLE DOME
PYRAMID HILLS
LEMOORE
HANFORD
VISALIA
TULARE
TRICO

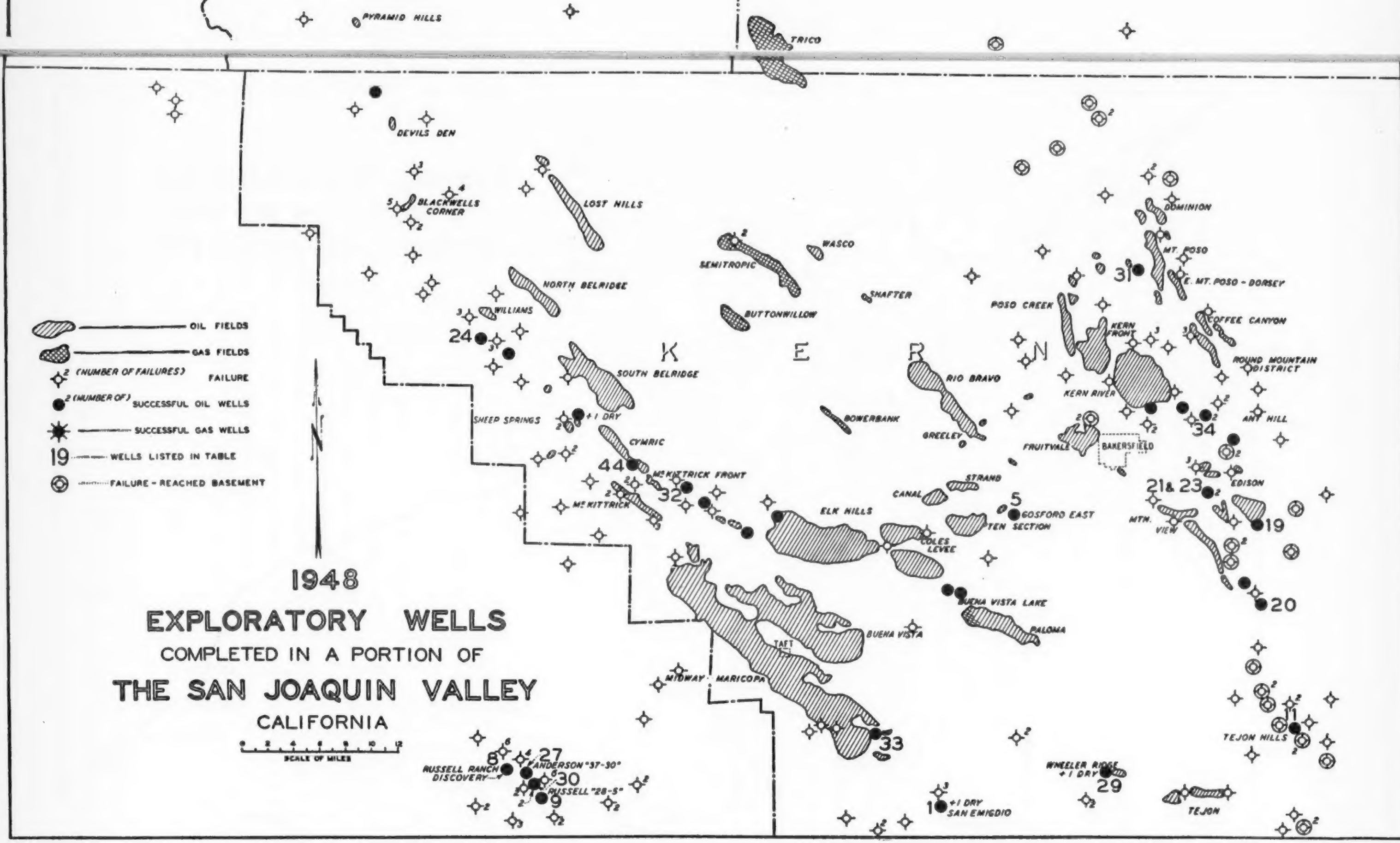
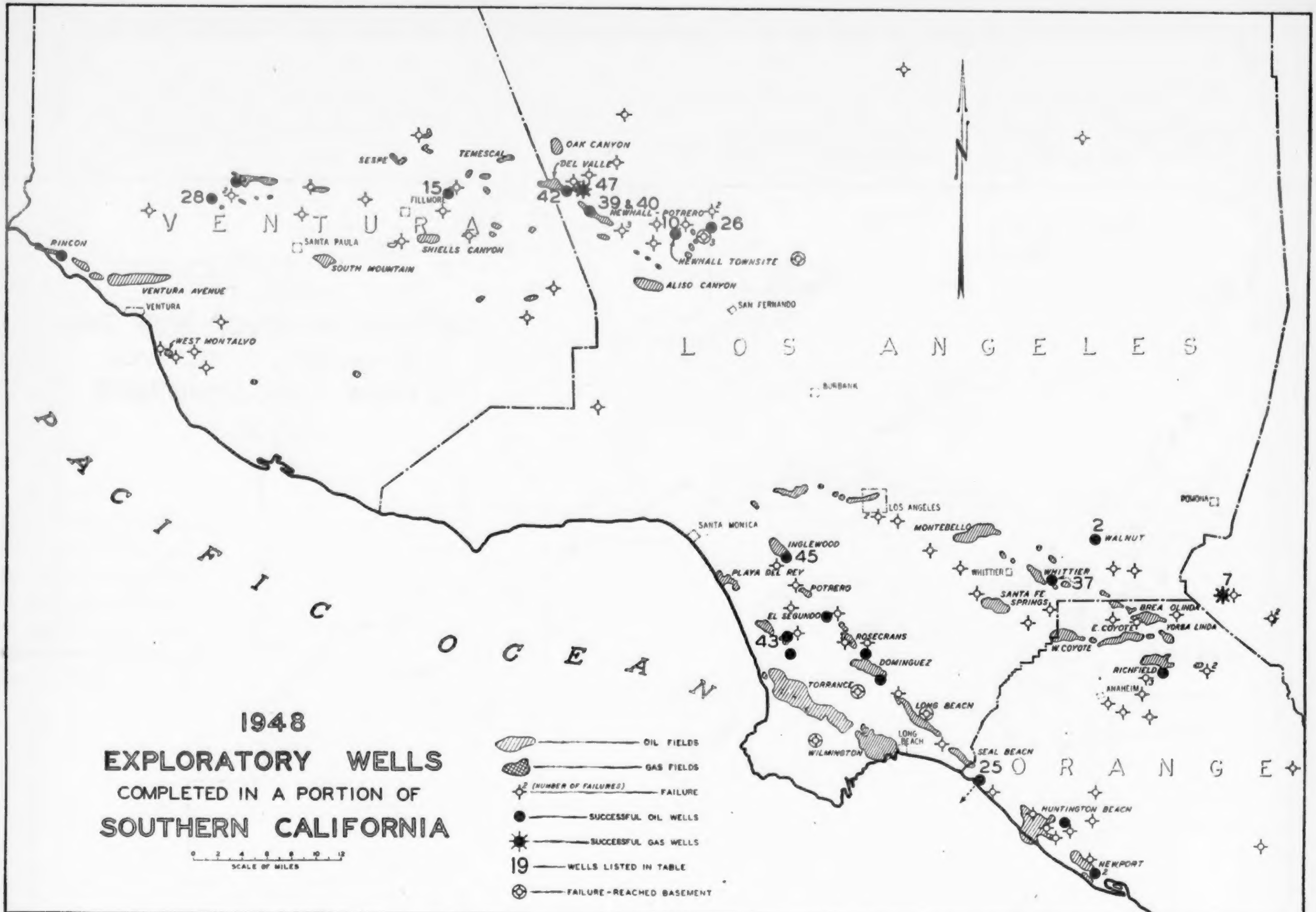

1948
EXPLORATORY WELLS
COMPLETED IN A PORTION OF
THE SAN JOAQUIN VALLEY
CALIFORNIA
SCALE OF MILES
OIL FIELDS
GAS FIELDS
(NUMBER OF FAILURES) FAILURE
(NUMBER OF) SUCCESSFUL OIL WELLS
SUCCESSFUL GAS WELLS
WELLS LISTED IN TABLE
FAILURE - REACHED BASEMENT
K E R N
PYRAMID HILLS
TRICO
DEVILS DEN
BLACKWELLS CORNER
LOST HILLS
NORTH BELRIDGE
WILLIAMS
SOUTH BELRIDGE
SHEEP SPRINGS
CYMRIC
McKITTRICK FRONT
McKITTRICK
SEMITROPIC
WASCO
SHAFTER
BUTTONWILLOW
BOWERBANK
RIO BRAVO
GREELEY
ELK HILLS
CANAL
STRAND
COLES LEVEE
TEN SECTION
GOSFORD EAST
BUENA VISTA LAKE
PALOMA
BUENA VISTA
TAFT
MIDWAY MARICOPA
POSO CREEK
KERN FRONT
KERN RIVER
FRUITVALE
BAKERSFIELD
DOMINION
MT. POSO
E. MT. POSO - DORSEY
COFFEE CANYON
ROUND MOUNTAIN DISTRICT
ANT HILL
EDISON
MTN. VIEW
TEJON HILLS
TEJON
WHEELER RIDGE +1 DRY
SAN EMIGDIO +1 DRY
RUSSELL RANCH DISCOVERY
ANDERSON "37-30"
RUSSELL "28-5"

FIG. 2-A


1948
EXPLORATORY WELLS
COMPLETED IN A PORTION OF
SOUTHERN CALIFORNIA
SCALE OF MILES
0 2 4 6 8 10 12
OIL FIELDS
GAS FIELDS
2 (NUMBER OF FAILURES) FAILURE
SUCCESSFUL OIL WELLS
SUCCESSFUL GAS WELLS
19 WELLS LISTED IN TABLE
FAILURE-REACHED BASEMENT
VENTURA
LOS ANGELES
ORANGE
PACIFIC OCEAN
RINCON
VENTURA AVENUE
VENTURA
WEST MONTALVO
SANTA PAULA
SOUTH MOUNTAIN
SESPE
FILLMORE
SHIELLS CANYON
TEMESCAL
OAK CANYON
DEL VALLE
NEWHALL
POTRERO
NEWHALL TOWNSITE
ALISO CANYON
SAN FERNANDO
BURBANK
SANTA MONICA
LOS ANGELES
MONTEBELLO
INGLEWOOD
PLAYA DEL REY
POTRERO
EL SEGUNDO
ROSECRANS
DOMINGUEZ
TORRANCE
WILMINGTON
LONG BEACH
LONG BEACH
SEAL BEACH
WHITTIER
WHITTIER
SANTA FE SPRINGS
WALNUT
POMONA
BREA OLINDA
E. COYOTE
YORBA LINDA
W. COYOTE
RICHFIELD
ANAHEIM
HUNTINGTON BEACH
NEWPORT
28
15
42
47
39 & 40
10
26
45
43
2
37
7
25

VI. Successful outposts are shown on the maps but are neither numbered nor listed.

The number of wells, amount to footage and success percentage for each of the five types of exploratory wells, subdivided into oil-exploratory and gas-exploratory, are given in Table I.

The success factor for number of wells decreased to 16.6 per cent from the 20.2 per cent in 1947 and for footage to 15.6 per cent from the 19.5 per cent in 1947 and for footage to 15.6 per cent from the 19.5 per cent in 1947, but total rewards actually were higher in 1948 than in the previous year. New-field wildcats, most hazardous of exploratory holes, were much more successful as to number of holes in 1948, 7.8 per cent, but not so successful as to footage, 5.3 per cent. Comparable figures for 1947 were 4.8 per cent and 5.9 per cent respectively.

The five counties that enjoyed greatest exploratory activity during 1948 accounted for 76 per cent of exploratory holes and 75 per cent of exploratory footage. Kern County was again far in the lead and Los Angeles retained its second place. It may be noted from the following list that Monterey and San Luis Obispo replaced Fresno and Orange from the most active roster in 1947. Accelerated exploratory effort in Santa Barbara and San Luis Obispo was due largely to discovery of the Russell Ranch field, astride the county line, early in 1948. The discovery of the Campbell pool in the San Ardo field in the Salinas Valley, Monterey County, stimulated exploratory drilling in that region.

Exploratory Wells

County	*Number*	*Success Percentage*	*Exploratory Footage*
Kern	201	14.4	756,235
Los Angeles	58	25.9	329,115
Santa Barbara	49	18.4	199,777
Monterey	31	9.7	129,209
San Luis Obispo	30	10.0	93,702

Data on 57 unsuccessful exploratory holes that reached basement are given in Table VII. Each of these "basement" dry holes is distinguished on Figures 1, 2, 2-A, and 2-B by an extra circle around the usual symbol for an abandoned hole.

There were 17 seismograph and no gravimeter parties active at the close of 1948. Comparable figures at the end of 1947 were 13 and none, respectively.

The relative importance and success of geological, geophysical, and other methods in locating the exploratory holes are given in Tables II and III, which treat number of wells and footage, respectively. Tables II-A and III-A are recapitulations to show the accomplishments of the most important methods by themselves and their total accomplishments when aided and abetted, or hindered as the case may be, by other methods. A short discussion was given a year ago[4]

[4] Graham B. Moody, "Developments in California in 1947," *Bull. Amer. Assoc. Petrol. Geol.*, Vol. 32, No. 6 (June, 1948), p. 877.

TABLE I

SUMMARY

EXPLORATORY WELL COMPLETIONS BY ALL OPERATORS

CALIFORNIA - 1948

	NUMBER OF WELLS COMPLETED			EXPLORATORY FOOTAGE					
				TOTAL FOOTAGE			AVERAGE PER WELL		
					SUCCESSFUL WELLS			SUCCESSFUL WELLS	
	All Wells	Successful Wells	Success Percentage	All Wells	Amount(a)	Percentage	All Wells	Successful Footage Only	Total Exploratory Footage Drilled
NEW FIELD WILDCATS:									
Drilled primarily to find oil	216	16(p)	7.4	874,329	45,407(b)	5.2	4,048	2,838	3,072
Drilled primarily to find gas	16	2	12.5	70,430	4,746(c)	6.7	4,402	2,373	3,001
Totals	232	18	7.8	944,759	50,153	5.3	4,072	2,786	3,064
NEW POOL WILDCATS:									
Drilled primarily to find oil	120	19(r)	15.8	479,440	63,825(d)	13.3	3,995	3,359	3,856
Drilled primarily to find gas	3	1	33.3	13,257	3,218(e)	24.3	4,419	3,218	3,700
Totals	123	20	16.3	492,697	67,043	13.6	4,006	3,352	3,849
DEEPER POOL TESTS:									
Drilled primarily to find oil	28	7	25.0	80,576(n)	17,407(f)	21.6	2,878	2,487	2,977
Drilled primarily to find gas	4	1	25.0	13,612(o)	3,030(g)	22.3	3,403	3,030	4,232
Totals	32	8	25.0	94,188	20,437	21.7	2,943	2,555	3,134
SHALLOWER POOL TESTS:									
Drilled primarily to find oil	2	-	-	3,490	-	-	1,745	-	-
Drilled primarily to find gas	1	1	100.0	2,220	2,220	100.0	2,220	2,220	2,220
Totals	3	1	33.3	5,710	2,220	38.9	1,903	2,220	2,220

OUTPOSTS:									
Drilled primarily to find oil	89	31(s)	34.8	435,724	162,379(h)	37.3	4,896	5,238	5,589
Drilled primarily to find gas	9	3(t)	33.3	32,288	11,119(j)	34.4	3,588	3,706	3,982
Totals	98	34	34.7	468,012	173,498	37.0	4,776	5,103	5,447
TOTALS OF ALL EXPLORATORY WELLS:									
Drilled primarily to find oil	455	73	16.0	1,873,559	289,018(k)	15.4	4,118	3,959	4,336
Drilled primarily to find gas	33	8	24.2	131,807	24,333(l)	18.5	3,994	3,042	3,512
GRAND TOTALS	488	81	16.6	2,005,366	313,351(m)	15.6	4,109	3,869	4,255

(a) This is net discovery or net successful footage.

(b) Drilled an additional 3,742 feet of dry exploratory footage.

(c) Drilled an additional 1,255 feet of dry exploratory footage.

(d) Drilled an additional 9,446 feet of dry exploratory footage.

(e) Drilled an additional 482 feet of dry exploratory footage.

(f) Drilled an additional 3,433 feet of dry exploratory hole and 40,905 feet of non-exploratory hole to pass previously productive zones.

(g) Drilled an additional 1,202 feet of dry exploratory hole and 2,570 feet of non-exploratory hole to pass previously productive zones.

(h) Drilled an additional 10,878 feet of dry exploratory footage.

(j) Drilled an additional 827 feet of dry exploratory footage.

(k) Drilled an additional 27,499 feet of dry exploratory hole.

(l) Drilled an additional 3,766 feet of dry exploratory hole.

(m) All successful exploratory wells drilled an additional 31,265 feet of dry exploratory hole.

(n) Drilled an additional 121,884 feet of non-exploratory hole to pass previously productive zones.

(o) Drilled an additional 6,754 of non-exploratory hole to pass previously productive zones.

(p) Two of these started as new-field wildcats, but finished as discovery wells of new pools. One other found gas instead of oil.

(r) Two of these started as new pool wildcats but finished as extension wells of previously producing zones.

(s) One of these started as outpost but finished as discovery well of new pool..

(t) All three of these finished as discovery wells of new pools.

TABLE II

EXPLORATORY WELLS ALLOCATED TO TYPE OF WELL AND TO BASIS FOR LOCATING WELL

	NEW-FIELD AND NEW-POOL WILDCATS			DEEPER-AND SHALLOWER-POOL TESTS			OUTPOSTS			TOTALS		
	Total	SUCCESSFUL WELLS		Total	SUCCESSFUL WELLS		Total	SUCCESSFUL WELLS			SUCCESSFUL WELLS	
	Wells	Number	Success %	Wells	Number	Success %	Wells	Number	Success %	Wells	Number	Success %
Surface geology	47	6	12.8	-	-	-	1	-	-	48	6	12.5
Surface and core drilling	2	-	-	-	-	-	-	-	-	2	-	-
Surface and trend	5	1	20.0	-	-	-	-	-	-	5	1	20.0
Surface and subsurface and core drilling	3	1	33.3	-	-	-	-	-	-	3	1	33.3
Surface and subsurface and core drilling and seismic	1	-	-	-	-	-	-	-	-	1	-	-
Surface and subsurface and gravity	1	1	100.0	-	-	-	-	-	-	1	1	100.0
Surface and subsurface and seismic	4	-	-	-	-	-	-	-	-	4	-	-
Surface and subsurface and trend	8	-	-	-	-	-	1	-	-	9	-	-
Surface and subsurface geology	97	13	13.4	8	-	-	29	8	27.6	134	21	15.7
Subsurface geology	98	11	11.2	20	7	35.0	39	15	38.5	157	33	21.0
Subsurface and core drilling	-	-	-	-	-	-	1	-	-	1	-	-
Subsurface and core drilling and seismic	1	1	100.0	-	-	-	1	1	100.0	2	2	100.0
Subsurface and trend	3	-	-	2	1	50.0	9	5	55.6	14	6	42.9
Subsurface and trend and seismic	-	-	-	-	-	-	1	-	-	1	-	-
Subsurface and seismic	35	2	5.7	4	1	25.0	10	3	30.0	49	6	12.2
Seismic	2	-	-	-	-	-	-	-	-	2	-	-
Trend and seismic	2	-	-	-	-	-	-	-	-	2	-	-
Trend	6	1	16.7	1	-	-	1	1	100.0	8	2	25.0
Geochemical	1	-	-	-	-	-	-	-	-	1	-	-
Non-Technical	26	1	3.8	-	-	-	4	-	-	30	1	3.3
Unknown	13	-	-	-	-	-	1	1	100.0	14	1	7.1
TOTALS	355	38	10.7	35	9	25.7	98	34	34.7	488	81	16.6

concerning the purpose and significance of these tables. It is suggested again that any conclusions drawn regarding a comparison of the relative merits of various exploratory methods based on their percentages of success should be confined to new-field and new-pool wildcats, and, furthermore, should be modified to recognize the stage of exploratory development in the area. Geophysical work in 1948 supplemented geology in the location of only three of the successful new-field and new-pool wildcats.

TABLE II-A

RECAPITULATION OF TABLE II

NUMBER OF WELLS

	All Exploratory Wells			*New-Field and New-Pool Wildcats Only*		
	Number	*% of Total*	*Success %*	*Number*	*% of Total*	*Success %*
SURFACE GEOLOGY						
By itself	49	9.8	12.5	47	13.2	12.8
Wherever involved	207	42.4	14.5	168	47.3	17.9
SUBSURFACE GEOLOGY						
By itself	157	32.2	21.0	98	27.6	11.2
Wherever involved	376	77.0	18.6	251	70.7	11.6
GEOLOGY—TOTAL[a]						
By itself	213	43.6	19.2	151	42.5	11.9
Wherever involved	441	90.4	17.9	313	88.2	11.8
GEOPHYSICS—TOTAL						
By itself[b]	2	0.4	—	2	0.6	—
Wherever involved[c]	62	12.7	14.5	46	13.0	8.7
GEOCHEMICAL AND NON-TECHNICAL AND UNKNOWN	45	9.2	4.4	40	11.3	2.5

[a] Includes surface and subsurface geology, trend and core drilling.
[b] This is all seismic.
[c] Includes seismic and gravity.

DISCOVERIES

Thirty-eight successful new-field and new-pool wildcats discovered 13 oil fields, 19 oil pools, 3 gas fields, and 1 gas pool, and extended 2 previously producing oil pools. These successful wells are listed in Tables IV and V. Deeper- and shallower-pool tests (Table VI) discovered 7 oil pools and 2 gas pools.

A number of these discoveries can be described significantly as non-profit ventures even though successful from an academic standpoint. Others add comparatively small amounts to the reserves of oil and gas. A few of the discoveries add substantially to oil reserves, are of major importance, and merit a few descriptive words amplifying the data in the tabulations.

RUSSELL RANCH FIELD

The Norris Oil Company's Cuyama No. 2 well discovered production in the Cuyama Valley on January 2, 1948. This started an intensive exploratory drilling

TABLE III

EXPLORATORY FOOTAGE ALLOCATED TO TYPE OF WELL AND TO BASIS OF LOCATING WELL

	NEW-FIELD AND NEW-POOL WILDCATS			DEEPER- AND SHALLOWER- POOL TESTS			OUTPOSTS			TOTALS		
	Total	SUCCESSFUL FOOTAGE		Total	SUCCESSFUL FOOTAGE		Total	SUCCESSFUL FOOTAGE		Total	SUCCESSFUL FOOTAGE	
	Footage	Amount	Success %	Footage	Amount	Success %	Footage	Amount	Success %	Footage	Amount	Success %
Surface geology	135,884	10,153	7.5	-	-	-	1,938	-	-	137,822	10,153	7.4
Surface and core drilling	6,034	-	-	-	-	-	-	-	-	6,034	-	-
Surface and trend	12,466	2,268	18.2	-	-	-	-	-	-	12,466	2,268	18.2
Surface and subsurface and core drilling	8,748	820	9.4	-	-	-	-	-	-	8,748	820	9.4
Surface and subsurface and core drilling and seismic	5,456	-	-	-	-	-	-	-	-	5,456	-	-
Surface and subsurface and gravity	3,000	2,816	93.9	-	-	-	-	-	-	3,000	2,816	93.9
Surface and subsurface and seismic	23,141	-	-	-	-	-	-	-	-	23,141	-	-
Surface and subsurface and trend	20,198	-	-	-	-	-	4,800	-	-	24,998	-	-
Surface and subsurface geology	388,730	29,993	7.7	23,628	-	-	132,572	42,657	32.2	544,930	72,650	13.3
Subsurface geology	417,406	52,672	12.6	50,339	13,977	27.8	188,121	75,166	40.0	655,866	141,815	21.6
Subsurface and core drilling	-	-	-	-	-	-	2,496	-	-	2,496	-	-
Subsurface and core drilling and seismic	3,001	1,930	64.3	-	-	-	1,801	1,450	80.5	4,802	3,380	70.4
Subsurface and trend	13,109	-	-	6,578	3,030	46.1	46,776	23,751	50.8	66,463	26,781	40.3
Subsurface and trend and seismic	-	-	-	-	-	-	2,850	-	-	2,850	-	-
Subsurface and seismic	269,913	13,599	5.0	19,111	5,650	29.6	79,496	27,869	35.1	368,520	47,118	12.8
Seismic	7,573	-	-	-	-	-	1,589	1,500	94.4	9,162	1,500	16.4
Trend and seismic	11,651	-	-	-	-	-	-	-	-	11,651	-	-
Trend	13,576	2,225	16.4	242	-	-	-	-	-	13,818	2,225	16.1
Geochemical	8,517	-	-	-	-	-	-	-	-	8,517	-	-
Non-Technical	55,661	720	1.3	-	-	-	4,366	-	-	60,027	720	1.2
Unknown	33,392	-	-	-	-	-	1,207	1,105	91.5	34,599	1,105	3.2
TOTALS	1,437,456	117,196	8.2	99,898	22,657	22.7	468,012	173,498	37.1	2,005,366	313,351	15.6

program in a region that had been condemned previously by many in the oil industry as offering no possibility of commercial production. The Richfield Oil Corporation completed its Russell 28-5 on June 13, producing 500 barrels of 38.5° oil daily, thereby establishing Cuyama Valley at that time as a potentially major oil-producing province. This well was $3\frac{1}{4}$ miles southeast from the Norris well. Richfield completed its Anderson 37-30 on June 18, producing at a rate variously estimated from 600 to 4,000 barrels daily. This well was $2\frac{1}{4}$ miles north-

TABLE III-A

RECAPITULATION OF TABLE III

FOOTAGE

	All Exploratory Wells			*New-Field and New-Pool Wildcats Only*		
	Footage	*% of Total*	*Success %*	*Footage*	*% of Total*	*Success %*
SURFACE GEOLOGY						
By itself	137,822	6.9	7.4	135,884	9.5	7.5
Wherever involved	766,595	38.2	11.6	603,657	42.0	7.6
SUBSURFACE GEOLOGY						
By itself	655,866	32.7	21.6	417,406	29.0	12.6
Wherever involved	1,711,270	85.3	17.3	1,152,702	8.0	8.8
GEOLOGY—TOTAL[a]						
By itself	807,506	40.3	19.1	566,866	39.4	11.5
Wherever involved	1,893,061	94.4	16.4	1,332,313	92.7	8.7
GEOPHYSICS—TOTAL						
By itself[b]	9,162	0.5	16.4	7,573	0.5	—
Wherever involved[c]	428,582	21.4	12.8	323,735	22.5	5.7
GEOCHEMICAL AND NON-TECHNICAL AND UNKNOWN	103,143	5.1	1.8	97,570	6.8	0.7

[a] Includes surface and subsurface geology, trend and core drilling.
[b] This is all seismic.
[c] Includes seismic and gravity.

west from Russell 28-5. Subsequent development indicated that there were two main pools, disconnected areally, in which faults formed the updip closures. The original Norris well was located apparently in a separate fault block that afforded only a small reservoir for oil.

There were 43 wells producing 12,000 barrels daily at the close of 1948. The Richfield Oil Corporation had 42 of these producers, the Hancock Oil Company one, and the original Norris well was still capable of producing 10 barrels daily. The field originally was named Cuyama Valley but this was changed to Russell Ranch. It is segregated into the White Rock area, which has the Norris and the Anderson 37-30 pools, and the Russell area which has only the Russell 28-5 pool. It straddles the line between San Luis Obispo and Santa Barbara counties. Production is from the Miocene.

TABLE IV

1948 DISCOVERIES IN CALIFORNIA. SUCCESSFUL NEW-FIELD WILDCATS

Operator	Discovery Well	County	Location S-T-R	Compl. Date	Total Depth (Feet)	Net Discovery Footage	Rated Initial Prodn. B/D	Age or Name of Prodg. Formation	Name of New Field Discovered	Method of Locating Discovery Well
				WELLS DRILLED PRIMARILY IN SEARCH OF OIL						
1. Apex Pet. Corp.	Los Lobos 3	Kern	5-10n-22w	3-4	1,481	1,415	75	L. Miocene	San Emidio	Surface and subsurface
2. Bardeen, H. A.	Lautenbach 1	Los Angeles	10-2s-10w	5-12	2,009	1,560	25	M. Puente	Walnut	Surface and subsurface
3. Barnsdall Oil	Fred Smith 1	Fresno	34-20s-16e	9-19	8,730	8,661	827	Leda (Oligo.)	Guijarral Hills	Subsurface
4. Continental Oil	LeRoy 2	San Luis Obispo	2-10n-36w	6-29	2,759	2,740	60	Foxen	Guadelupe	Subsurface
5. Hancock Oil	K.C.L. 85-23	Kern	23-30s-26e	12-12	8,473	7,839	500	U. Miocene	Gosford East	Subsurface and seismic
6. Jergins and No. Amer.	Orradre 1 (b)	Monterey	12-23s-10e	5-16	2,225	2,225	4,000(a)	Miocene	Campbell Pool	Trend
7. Mercury Oil	No. 1	San Bernardino	32-2s-8w	6-48	1,273	1,273	1,070(a)	Puente	Not named	Surface
8. Norris Oil	Cuyama 2	San Luis Ob.	25-11n-28w	1-2	1,976	1,880	300	Miocene	Russell Ranch	Surface and subsurface
9. Richfield Oil	Russell A28-5(c)	Santa Barbara	5-10n-27w	6-13	4,218	3,360	508	Miocene	"28-5" Pool	Surface
10. Sherman, R. W.	Newhall Comm. 3-1	Los Angeles	2-3n-16w	12-17	5,846	5,760	265	Miocene	Newhall Townsite	Subsurface and seismic
11. Tejon Hills Oil	Tejon Hills 2	Kern	10-11n-18w	7-24	408	380	50	Sta.Margarita	Tejon Hills	Surface
12. Texas Co.	Aurignac NCT-1 #4	Monterey	4-23s-10e	12-28	2,780	2,750	60	Miocene	Los Lobos	Surface and subsurface
13. Texas Co.	Biaggi 2	Monterey	12-22s-9e	8-9	1,159	1,159	28	Miocene	Paris Valley	Surface and subsurface
14. Texas Co.	Nicholas 1	San Benito	28-16s-12e	7-30	1,252	1,081	18	Basal Eocene	Ciervo	Surface
15. T & T Oil	Hickler 1	Ventura	22-4n-19w	Susp.9-15	2,286	1,056	8	Valv. Cal.(Mio.)	Not named	Surface and subsurface
16. Union Oil	Jesus Maria 1	Sta. Barbara	34-9n-35w	9-21	2,274	2,268	35	Miocene	Burton Mesa	Surface and trend
				WELLS DRILLED PRIMARILY IN SEARCH OF GAS						
17. Honolulu Oil	McCormick Est. 1	Solano	36-5n-1w	6-1	3,001	1,930	7,000(a)	McCormick	Denverton	Subsurface, core drilling and seismic
18. Shell Oil	Pleasant Creek 3-1	Yolo	8-8n-1w	12-22	3,000	2,816	6,450(a)	Martinez	Pleasant Creek	Surface, subsurface and gravity

(a) MCF per day.

(b) This well discovered the prolific Campbell pool of the San Ardo field in Salinas Valley.

(c) First large producer in Russell Ranch field.

TABLE V

1948 DISCOVERIES IN CALIFORNIA. SUCCESSFUL NEW-POOL WILDCATS

TABLE V

1948 DISCOVERIES IN CALIFORNIA. SUCCESSFUL NEW-POOL WILDCATS

Operator	Discovery Well	County	Location S-T-R	Compl. Date	Total Depth (Feet)	Net Disc. Footage	Rated Initial Prodn. B/D	Age or Name of Prodg. Formation	Name of (b) New Pool Discovered	Method of Locating Discovery Well
WELLS DRILLED PRIMARILY IN SEARCH OF OIL										
19. Beloil Corp.	Lawson-Bennett 45-26-1	Kern	26-30s-29e	12-26	2,958	2,958	37	Sta.Margarita	Lawson-Bennett(Edison)	Subsurface
20. Brit. Amer. & Capital	Arvin 47A-26	Kern	26-31s-29e	3-25	8,638	7,380	230	Miocene	Cattani(Arvin)	Subsurface
21. First National Finance	De-Mille-First Nat. Fin.-Jeppi 1	Kern	17-30s-29e	4-13	3,449	3,290	48	Chanac	DeMille-Jeppi(Edison)	Subsurface
22. General Pet. Corp.	Los Flores 86-21	Sta.Barbara	21-9n-33w	10-16	5,037	5,037	130	Miocene	"86-21"(Cat Canyon)	Surface and subsurface
23. Independent Expl.	Alexis-Day	Kern	18-30s-29e	11-9	3,664	3,643	10	Chanac	Alexis-Day(Edison)	Subsurface
24. Independent Expl.	Layman 2	Kern	18-28s-20e	5-13	1,620	1,372	25	Devilwater	Gould sand(N.Belridge)	Subsurface
25. Marine Explor.	State 2	Los Angeles	11-5s-12w	11-7	12,131	12,131	72	Miocene	State 2(Belmont Shore)	Subsurface
26. Nelson-Phillips	Kraft 1	Los Angeles	31-4n-15w	4-21	2,220	720	60	Saugus	Kraft (Placerita)	Non-Technical
27. Richfield Oil	F.R.Anderson 37	San Luis Obispo	30-11n-27w	6-18	3,022	3,022	627	Painted Rock	Anderson 37-30(Russell Ranch)	Surface
28. Richfield Oil	W.A.Freeman 2	Ventura	21-4n-22w	12-30	2,478	1,930	17	Miocene	Freeman(Sulphur Mt.N.)	Surface and subsurface
29. Richfield Oil	KCL Coal Oil Cnyn.72-29	Kern	29-11n-20w	5-22	1,176	1,176	126	Sta.Margarita	Coal Oil Canyon (Wheeler Ridge)	Surface and subsurface
30. Richfield Oil	Quality 88-31	Sta.Barbara	31-11n-27w	10-30	3,360	3,248	900	Painted Rock	Anderson 37-30 (Russell Ranch)	Subsurface
31. Ring Oil	#1	Kern	20-27s-28e	8-11	2,337	2,307	50	Vedder	Sec."18" Pool(Mt.Poso)	Subsurface
32. Signal Oil	Signal Pike 1	Kern	10-30s-22e	9-10	7,507	5,240	15	U. Miocene	Signal Pike 1 (.Elk Hills)	Surface and subsurface
33. Standard of Calif.	54-9K	Kern	9-11n-23w	4-27	5,300	4,942	60	Maricopa	54-9K(Maricopa)	Subsurface
34. Standard of Calif.	B.M.Cohn 10-2	Kern	28-29s-29e	8-26	1,300	820	7	Chanac	Cohn 10-2(Race Track)	Surface and subsurface and core drilling
35. Texas Company	Ashurst NCT-1 #1	San Benito	27-16s-11e	9-3	1,688	1,037	7	Basal Eocene	Ashurst (Ciervo)	Surface
36. Trico Oil	Petaluma Comm. 5-2	Sonoma	30-5n-6w	4-24	971	968	25	Petaluma	"5-2" Pool(Petaluma)	Surface and subsurface
37. Union & Fullerton	Mineral Springs 3	Los Angeles	25-2s-11w	10-13	4,415	2,604	8	Miocene	Not named(Whittier)	Surface and subsurface
DRILLED PRIMARILY IN SEARCH OF GAS										
38. Standard of Calif.	Williams 1	Sta. Barbara	16-4n-26w	10-1	3,700	3,218	2,155(a)	Sespe	Williams(Summerland)	Surface and subsurface

(a) MCF per day

(b) Field names in brackets.

TABLE VI

1948 DISCOVERIES IN CALIFORNIA. SUCCESSFUL DEEPER- AND SHALLOWER-POOL TESTS.

Operator	Discovery Well	County	Location S-T-R	Compl. Date	Total Depth (Feet)	Net Disc. Footage	Rated Init. Prodn. B/D	Age or Name of Prodg. Formation	Name of New Pool Discovered (b)	Method of Locating Discovery Well
DEEPER POOL TESTS(a)										
WELLS DRILLED PRIMARILY IN SEARCH OF OIL										
39. Barnsdall Oil	R.S.F. 65-6	Los Angeles	26-4n-17w	4-10	1,567	477	431	Miocene	7th Zone(Newhall-Potrero)	Subsurface
40. Barnsdall Oil	R.S.F. 66	Los Angeles	27-4n-17w	12-26	6,009	5,646	54	Miocene	9th Zone(Newhall-Potrero)	Subsurface
41. Honolulu Oil	State 309-2	Sta.Barbara	19-4n-29w	8-4	5,650	5,650	97	Lower Miocene	Vaqueros(Coal Oil Point)	Subsurface and seismic
42. Ohio Oil	Vasquez 14	Los Angeles	17-4n-17w	4-24	2,340	360	90	Miocene	Vasquez 14(Del Valle)	Subsurface
43. Seaboard Oil	Pauley-Seaboard 81-20	Los Angeles	20-3s-14w	2-6	466	466	282	Miocene	Pauley(Lawndale)	Subsurface
44. Standard of Calif.	11-3, 1Y	Kern	1-30s-21e	5-15	1,491	1,491	70	Upper Miocene	11-3, 1Y(McKittrick)	Subsurface
45. Standard of Calif.	Baldwin-Cienega 141	Los Angeles	17-2s-14w	11-27	3,317	3,317	35	Upper Miocene	Moynier(d)(Inglewood)	Subsurface
WELLS DRILLED PRIMARILY IN SEARCH OF GAS										
46. Shell Oil	Lambie 5	Solano	26-4n-1w	2-22	4,232	3,030	4,720(c)	Cretaceous	Lambie 5(Kirby Hill)	Subsurface and trend
SHALLOWER POOL TESTS										
WELLS DRILLED PRIMARILY IN SEARCH OF OIL										
47. Havenstrite, R.E.	Barnes 9	Los Angeles	16-4n-17w	3-48	2,220	2,220	800(c)	Saugus	Saugus Pool(Del Valle)	Subsurface

(a) Successful deeper pool tests drilled an additional 43,475 feet of non-exploratory hole to pass previously productive pools.

(b) Field names in brackets.

(c) MCF per day.

(d) East of fault; no connection with previous Moynier pool.

TABLE VII

UNSUCCESSFUL CALIFORNIA EXPLORATORY WELLS THAT REACHED BASEMENT IN 1948

Operator and Lease	Location S-T-R	Total Depth	Type of Rock
KERN COUNTY			
48. Bolsa Chica Oil 1 Di Giorgio	4-31s-29e	5,865	Schist
49. British-American 36-32 Davis	32-25s-27e	4,496	Granite
50. C.C.M.O. 1 Tejon Ranch	23-32s-29e	4,680	Basement
51. Crevolin and Novelli #1	32-12n-18w	2,296	Granite
52. Independ. Explor. 74 Wright Bloemer	11-26s-26e	5,789	Granite
53. Jergins Oil 55 Tejon	9-11n-18w	1,780	Granite
54. M & S Oil 1 M & S	15-26s-28e	1,030	Schist
55. Mayflower Oil 1 J.O.L.	23-25s-27e	2,828	Basement
56. Miller & York 1 Di Giorgio	6-31s-30e	1,421	Basement
57. Pacific Western 4 Mott	9-31s-29e	1,352	Schist
58. Quinn Ranch Oil 1 Quinn	15-25s-27e	2,821	Granite
59. Richfield Oil B-1-15 Tejon	.15-11n-18w	1,398	Gneiss
60. Richfield Oil D-1-10 Tejon	10-11n-18w	1,202	Granite
61. Standard Oil 26 Buck Community	28-29s-29e	5,391	Basement
62. Steele Pet. 1 Grizzle	14-11n-18w	416	Granite
63. Steele Pet. 1 Tejon	14-10n-10w	1,078	Granite
64. Superior Oil 88 Dougherty	14-29s-27e	7,880	Basement
65. Superior Oil 15-11 K.C.L.	11-29s-27e	7,719	Basement
66. Superior Oil 1 Nissen	20-30s-30e	2,090	Granitic Basement
67. T & E Company 1 T.C.L.	24-11n-18w	330	Granitic Basement
68. " " " 1 Tejon Claire	36-32s-29e	1,047	Granite
69. Tejon Hills Oil 1 Tejon Hills	.10-11n-18w	1,224	Granite
70. Texas Co. 1 Hogan	4-31s-29e	7,551	Schist
LOS ANGELES COUNTY			
71. Antelope Valley #1	36-7n-13w	1,345	Basement
72. Carter, W. J. 1 Carter-Earl	5-3n-15w	205	Granite
73. Carter, W. J. 2 Carter-Earl	5-3n-15w	670	Granite
74. Carter, W. J. 3 Carter-Earl	5-3n-15w	1,104	Granite
75. General Pet. 8-1 Alondra Community	16-3s-14w	8,985	Schist
76. Lesco Oil 1 Sepulveda	35-4s-14w	700	Schist
77. Shell Oil 732 Community #1	20-4s-10w	10,368	Schist?
78 Standard of Calif. 1 Del Amo	8-4s-13w	10,251	Schist
MONTEREY COUNTY			
79. Barnsdall Oil 1 Echenique	35-21s-9e	948	Basement
80. Barnsdall Oil 1 P W & P	29-23s-11e	4,151	Basement
81. Bishop & Cuyama Oil 1 O'Reilly	32-22s-11e	2,491	Basement
82. Cuyama Oil 2 O'Reilly	28-22s-11e	2,962	Basement
83. Independent Exploration 1 Cooper	13-21s-8e	1,502	Gneiss
84. Indep. Expl. & Oceanic 1 Echenique	27-21s-9e	613	Basement
85. Independent Exploration 1 Thurman	3-22s-9e	1,785	Basement
86. Indep. Expl. & Oceanic 2 Thurman	33-21s-9e	2,212	Basement
87. Indep. Expl. & Oceanic 1 Trescony	32-21s-9e	3,266	Basement
88. Jergins & No.Amer. 73-11 Ferrini	11-23s-10e	242	Basement
89. Jergins & No.Amer. 1 McCool	27-22s-10e	2,110	Basement
90. Jergins & No.Amer. 3-1 McCool	15-22s-10e	2,327	Basement
91. Jergins & No.Amer. 3-2 McCool	10-22s-10e	1,828	Basement
92. Texas Company 1 Ansberry	11-22s-9e	1,791	Basement
93. Texas Company 3 Aurignac	31-22s-10e	4,765	Basement
94. Texas Company 1 Bingaman	35-20s-11e	3,326	Basement
95. Texas Company 1 Etcheberria(NCT One)	33-21s-11e	2,262	Basement
96. Texas Company 2 Lombardi	27-22s-10e	2,470	Basement
97. Texas Company 1 Rosenberg Two	8-22s-10e	2,124	Granite
98. Union Oil 1 Keans	8-22s-8e	5,588	Basement
SAN JOAQUIN COUNTY			
99. Amerada Pet. 25-2 Martenet	2-2n-8e	4,319	Basement
SAN LUIS OBISPO COUNTY			
100. Union Oil 1 Wreden	17-29s-17e	5,722	Granite
TULARE COUNTY			
101. Andrews, Miles 1 Carter-McAllister	16-18s-25e	1,756	Phillite Basement
102. Carter, W. J. 1 Carter-Chedester	21-18s-25e	1,677	Diorite
103. Humble Oil 1 Di Giorgio Fruit Co.	20-24s-26e	5,119	Schist
104. Jergins Oil 84-17 Cal-Grape	17-23s-26e	4,398	Schist

This discovery of Russell Ranch field is of great importance not only because it rates as a major field but also because it opens a new geological province to production and to further exploration which should result in discovery of more new productive areas. There will be numerous dry exploratory wells in the future, as there were in 1948, because the geology is sufficiently complex to require critical analysis and considerable fortitude to prosecute a successful exploratory campaign in this region.

GUIJARRAL HILLS FIELD

The Guijarral Hills field was discovered by the Barnsdall Oil Company's well Fred Smith No. 1 which was completed on September 19, producing about 800 barrels of 37.8° gravity oil from some 70 feet of Leda sand (Oligocene). This discovery was in Fresno County, 2 miles southeast of Pleasant Valley field, and was on the southeast plunge of the East Coalinga anticline. The possibilities of the area had been demonstrated by a well less than a mile southeast that had a good thickness of Leda sand containing water and a showing of oil, and by a second well a mile northwest that encountered no Leda sand. It was a pinch-out play based on subsurface geology. Collection of oil is controlled by structure and the limits of a sand body the size and shape of which have not been determined. This field adds substantially to oil reserves but does not appear to rank with the Russell Ranch discovery.

CAMPBELL POOL OF THE SAN ARDO FIELD

This pool was discovered by Orradre No. 1 of the Jergins Oil Company and the North American Consolidated Oil Company which was completed, May 16, producing 5,000 MCF daily from the Miocene. The well was $3\frac{1}{2}$ miles southeast from The Texas Company's Lombardi No. 1 which discovered the San Ardo field in November, 1947. Orradre No. 1 was considered to be a new-field wildcat when it started, but due to the field and pool designations later adopted, it discovered a new pool in the San Ardo field. The first well to get oil in the Campbell pool was Orradre 15-12, drilled by the same operators who discovered the pool; on June 14, it began producing 275 barrels daily of 12.5° gravity oil.

The Campbell pool was developed vigorously during the year and had 14 producers at the close of the year. It made a major addition to oil reserves and stimulated exploration in the Salinas Valley region.

ADDITIONS TO RESERVES

Additions to California's crude-oil reserves during 1948, derived from the annual reserves report of the American Petroleum Institute, were 58,000,000 barrels from new fields and new pools and 149,000,000 barrels from extensions—a total of 207,000,000 barrels, which was 61 per cent of the year's production. Indications are that further development of some of the new fields and new pools will demonstrate that the reserves credited to them at the close of 1948 were

conservative. It seems that 1948 was one of the best years since 1938 for discovery of new oil.

The crude-oil reserves on December 31, 1948, according to the American Petroleum Institute, were 3,763,583,000 barrels, an increase of 468,620,000 barrels over the previous year's figure.

The estimated natural-gas-liquids reserves prepared jointly by committees of the American Petroleum Institute and the American Gas Association were 307,908,000 barrels on December 31, 1948, a decrease of 4,243,000 barrels during 1948.

The reserves of gas on December 31, 1948, were given by the American Gas Association as 10,192,593,000 MCF, an increase of 28,237,000 MCF from the previous year.

DEVELOPMENTS

There were 2,150 producing oil wells added during 1948, an increase of 551 wells, or 34 per cent above 1947 results. The average rated initial production during 1948 was 137 barrels daily; the comparable figure for 1947 was 214 barrels daily. The thirteen fields most active from the standpoint of drilling are here listed. Data on number of wells added and rated initial productions are taken from monthly reports issued by the American Petroleum Institute.

	Number of Producing Wells Added	*Rated Initial Production (Barrels Daily)*	
		Total	*Per Well Average*
Kern River	257	7,166	28
Wilmington	190	41,679	219
Huntington Beach	185	20,259	110
Midway-Sunset	98	4,645	47
Lost Hills	81	6,373	79
Kern Bluff	67	4,729	71
Coalinga East	64	3,909	61
Cymric	57	2,933	61
Coalinga West	47	1,403	30
Newport	44	4,818	110
Russell Ranch	43	29,404	694
Cat Canyon West	41	7,829	191
Belridge South	40	1,393	35

Substantial extensions were made to several oil fields among which might be mentioned Cat Canyon West (Miocene zone), Coles Levee North, Elk Hills (Stevens zone), Jacalitos, Kern River, Lost Hills, South Mountain, Ventura Avenue (deep zones), and Zaca Creek.

Rio Vista led activity among dry-gas fields with 9 completions out of a total of 23 completions for all dry-gas fields.

The Carneros pool in the Salt Creek field was unitized in 1948. Unitization of Coalinga Nose field, Northeast Coalinga field, and the 27-B pool in Buena Vista Hills field probably will be consummated in 1949.

The new depth record of 17,696 feet set by the Standard Oil Company of California's Maxwell No. 1 in the Montalvo area, Ventura County, was still a

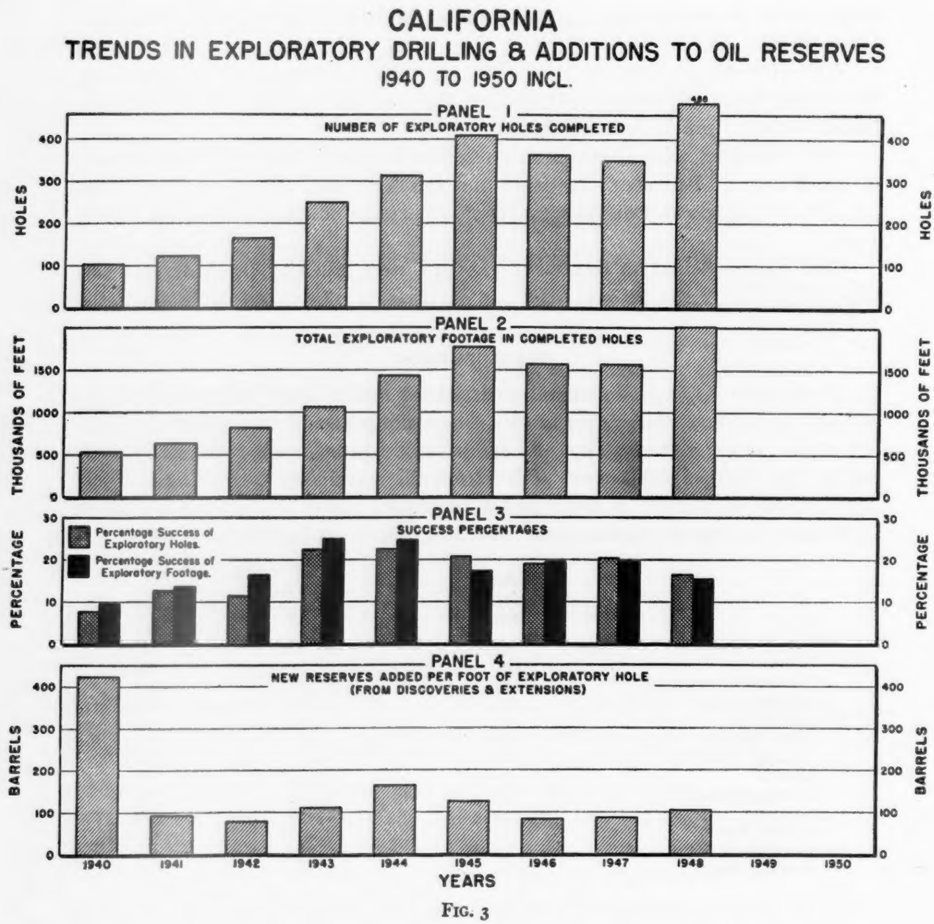


FIG. 3

record for California, but not for the United States, at the end of 1948. Records, however, are made to be broken, and this one was no exception.[5]

Production surpassed previous highs during 1948 and was as follows.

Crude oil	340,069,000 barrels
Natural-gas liquids, including condensate	26,480,000 barrels
Natural gas*	578,994,000 MCF

* Includes both dry gas-field gas and oil-well gas but excludes from the latter shrinkage caused by extraction of natural-gas liquids.

[5] Superior Oil Company's Limoneira No. 1 in the Montalvo area was drilling at 18,518 feet early in March, 1949.

The full impact of the 1947 increases in price of crude was apparent during 1948 in the record number of exploratory and development wells completed. The price increase permitted the drilling of many inside and edge locations that formerly were considered to be non-economic and, in addition, caused the return to production of many wells that had succumbed to the previous economic limit.

Among the 1948 events that affected or will affect exploration in California should be mentioned the following.

1. Strikes, both oil industry and maritime
2. Instigation of tidelands exploration
3. The Supreme Court's June 23d decision that the Federal Government has a "paramount" interest in California's tidelands

TRENDS

Figures 3 and 4 are continuations of like numbered figures in the report on 1947 developments. Panels 1 and 2 of Figure 3 show that exploratory effort

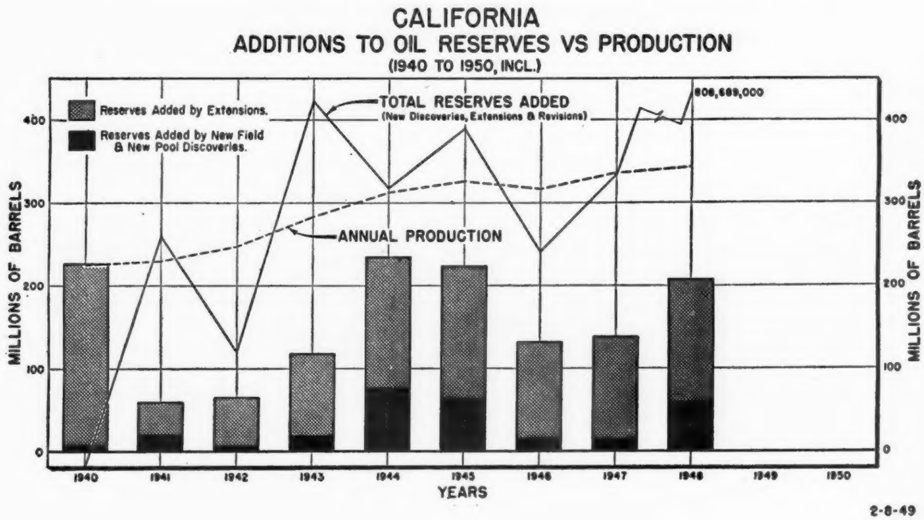


Fig. 4

registered new highs both as to number of wells and total footage; in fact, the 1948 bar for number of wells broke through the "ceiling" of Panel 1 and 1948 footage just dented the "ceiling" of Panel 2. Success percentages (Panel 3) were lower than any other year since 1942, but the rewards per foot of exploratory hole (Panel 4) were the greatest since 1945.

Panel 4, Figure 3, and all of Figure 4 are based on production and reserves data published annually by the American Petroleum Institute. The article on

1946 California developments[6] discussed briefly the estimates of reserves used in Panel 4 and Figure 4.

Reserves added from new discoveries and extensions in 1948 were greater than in 1947 or 1946 and nearly equal to 1945 and 1944. The fields and pools discovered in 1948 offer greater promise of increasing their reserves as estimated at the end of the year than did the fields and pools discovered in any other year shown on Figure 4. The conclusion is that the discovery record for 1948 was better in proportion to the years 1940 to 1947, inclusive, than the 1948 bar indicates.

Total reserves added in 1948 were so great, 808,689,000 barrels, that the scale of Figure 4 would not accommodate the entry; hence, a broken line for total reserves added.

Indications are that the rate of drilling of development wells may slacken somewhat during 1949 but that exploratory work probably will continue at a high level. It is not to be expected that new drilling records can be set again in 1949. It is not improbable that additions to reserves will be as great as in 1948. Certainly the results of exploration during the past year offer encouragement to those who maintain that substantial quantities of oil remain to be discovered in California.

[6] *Bull. Amer. Assoc. Petrol. Geol.*, Vol. 31, No. 6 (June, 1947), p. 945.

BULLETIN OF THE AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS
VOL. 33, NO. 6 (JUNE, 1949), PP. 827-836, 1 FIG., 4 TABLES

DEVELOPMENTS IN ROCKY MOUNTAIN REGION IN 1948[1]

C. L. DORN[2]
Denver, Colorado

ABSTRACT

Two hundred and seventy-seven exploratory wells were drilled in the Rocky Mountain region during 1948. Of these, 73 were successful. This represented a gain over the previous year, 1947, when, of 185 exploratory wells, 49 were successful. Permian and Pennsylvanian objectives provided the most new discoveries.

New pools discovered by the Sinclair-Wyoming Oil Company in the Deadwood formation of Cambrian age at Wertz and Lost Soldier, Sweetwater County, Wyoming, and by the Pure Oil Company in the Mesa Verde formation at West Poison Spider, Natrona County, Wyoming, were of great significance as neither of these formations had hitherto been productive in the Rocky Mountain states. Other important discoveries were in the basal Amsden at Big Wall and Melstone in central Montana and in the Hermosa formation at Dove Creek and Boundary Butte in the Four Corners area of Colorado and Utah. A deeper-pool discovery in the Weber formation at Ashley Valley, Uintah County, by the Equity Oil Company provided the source for the first commercial oil production in Utah.

Geophysical work increased during 1948, with the center of activity in Wyoming. Production of crude oil showed gains corresponding with the increased rate of exploratory drilling. Development drilling progressed rapidly particularly at Mush Creek, Weston County, Wyoming, where 88 new producers are reported. At Rangely, the development of the Weber Sand pool neared completion at the close of the year.

INTRODUCTION

The Rocky Mountain region includes the states of Montana, Wyoming, Utah, Colorado, Nevada, Idaho, North Dakota, South Dakota, and Nebraska. Practically all activity, however, is confined to the first four states.

As other authors will publish details and statistics dealing with drilling and production, these matters are not covered fully in this paper. Table II includes only the successful exploratory wells. These are spotted on Figure 1 by number (as listed in Table II) with the exception of a few wells which are too closely spaced for legibility.

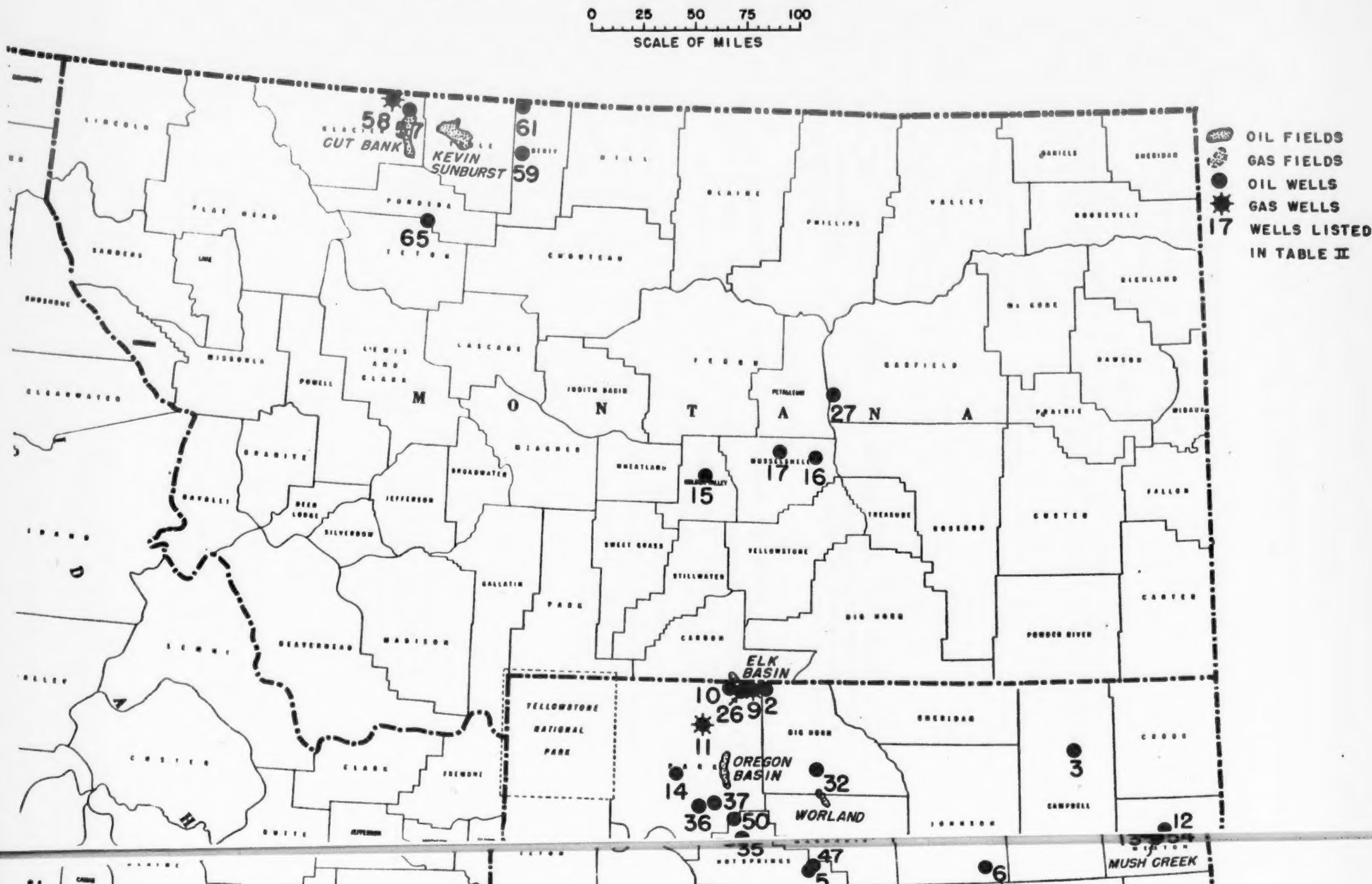
TABLE I
DISTRIBUTION EXPLORATORY WELLS
ROCKY MOUNTAINS 1948

	Wyoming	*Montana*	*Colorado*	*Utah*	*Other*
New fields	14	3	4	2	
New pools successful	3	1			
Shallower pools successful	3			1	
Deeper pools successful	13			1	
Outposts successful	11	10	6	1	
Exploratory wells dry	103	43	40	12	6
Totals—1948	147	57	50	17	6
Totals—1947	85	48	43	9	

[1] Manuscript received, March 23, 1949.

[2] Geologist, The California Company. The exploratory well statistics used here were furnished by W. S. McCabe, Casper, Wyoming, member of the committee on statistics of exploratory drilling. R. M. Larsen, Casper, Wyoming, kindly supplied the information on unitization. Other data used in this report were gathered from various sources and, in some cases, have not been processed officially. Some of it, therefore, is subject to correction and revision.

SUCCESSFUL EXPLORATORY WELLS ROCKY MOUNTAINS 1948



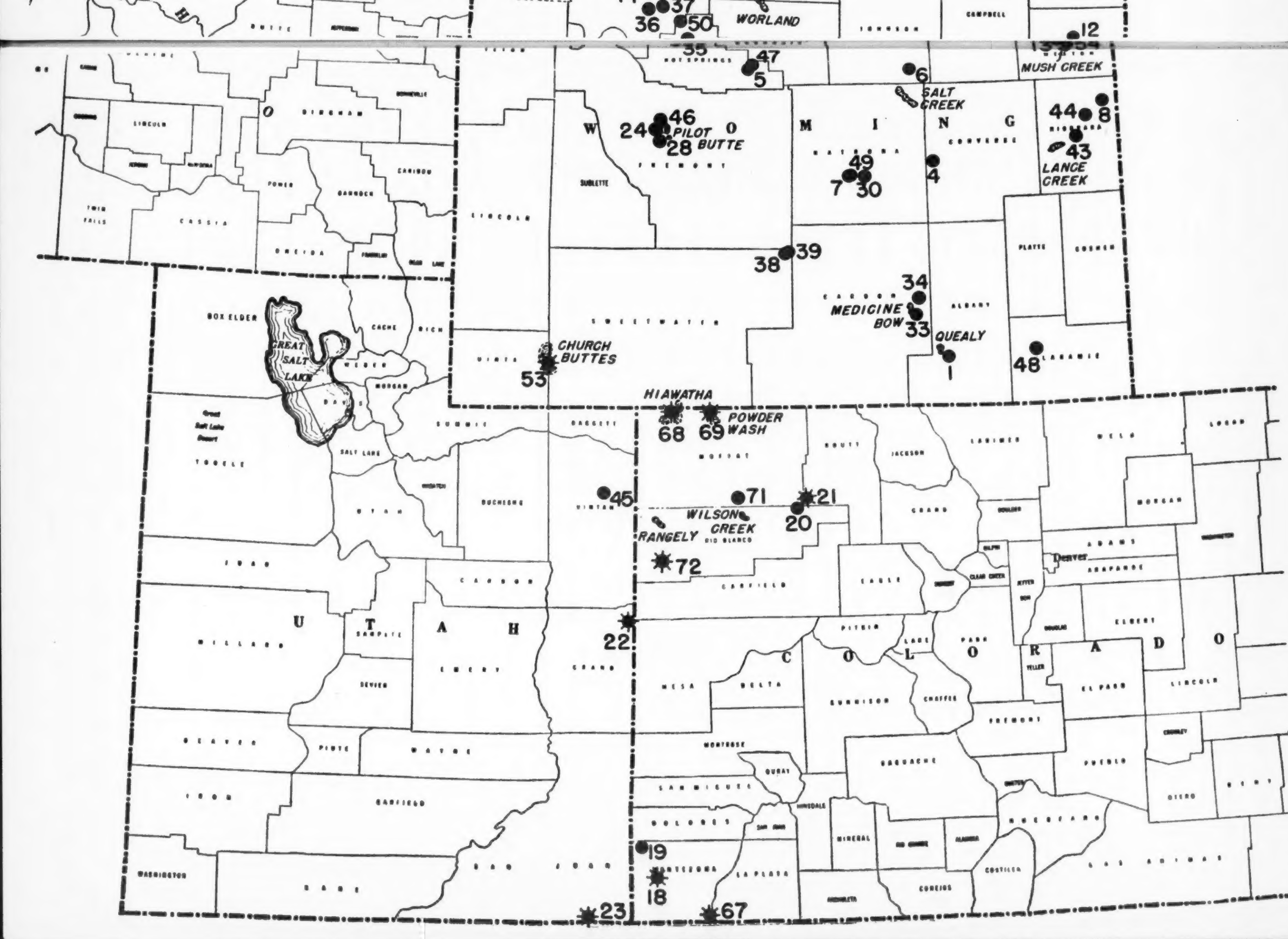

WORLAND
MUSH CREEK
SALT CREEK
PILOT BUTTE
LANCE CREEK
W O M I N G
MEDICINE BOW
QUEALY
CHURCH BUTTES
HIAWATHA
POWDER WASH
WILSON CREEK
RANGELY
GREAT SALT LAKE
U T A H
C O L O R A D O
Denver
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TABLE II

SUCCESSFUL WELLS ROCKY MOUNTAINS - 1948

Name of Producing Area	Operator	Discovery Well	County	Location S -T- R	Date Completion	Total Depth	Discovery Depth	Name Productive Formation	Initial Production	Method of Discovery
WYOMING NEW FIELDS										
1. Little Laramie	Superior & Calif.	Parkinson #1	Albany	5-16N-75W	6/25	3824	3756	Tensleep	80 BPD	Surface Seismic
2. Sage Creek	Barnsdall & Sohio	Fox #1	Big Horn	6-57N-97W	6/15	3450	3410	Madison	466 SO 12 Hrs.	Surface Sub-sur. Seismic
3. Adon	Texas Company	Unit #1	Campbell	2-52N-72W	3/4	9945	9345	Minnelusa	204 BPD	Seismic
4. S. Cole Creek	Phillips	Unit #1	Converse	17-34N-76W	9/4	8380	8333	Lakota	149 BPD	Seismic
5. Wild Horse Butte	Barney Cockburn	Unit #1	Hot Springs	2-42N-93W	9/1	1203	1203	Phosphoria	60 BPD	Surface
6. Taylor-Sussex	Continental	Alice Coles #1	Johnson	17-42N-78W	7/10	7726	7720	Lakota	241 BPD	Seismic Gravity
7. W.Poison Spider	Pure Oil	Unit #1	Natrona	11-33N-84W	7/12	14309	14309	Frontier	440 BPD	Seismic
8. Bridge Creek	Pacific Western	Grimes Govt. #1	Niobrara	31-39N-61W	9/9	2595	2574	Dakota	198 BPD	Surface Seismic Core Drg.
9. N. Danker	Continental	Unit #1	Park	8-57N-98W	12/11	6306	2926	Peay	2946 MCF	Surface Seismic
10. Silvertip	Seaboard & Resolute	N.P.#53-33	Park	33-58N-100W	4/22	9507	8515	Phosphoria	576 BPD	Seismic
11. Heart Mt.	Trigood	Taggart #1	Park	8-54N-102W	9/17	4018	2150	Frontier	6000 MCF	Surface
12. Fidler Creek	Clark Drlg. Co.	Wexell #1	Weston	19-46N-64W	11/1	4552	4520	Muddy	221 BPD	Non-Technical
13. Kummerele	Sierra & Lyon	Kummerele #1	Weston	14-45N-65W	10/2	5465	5378	Dakota	57 BPD	Non-Technical
14. South Shoshone	Continental	Unit #1	Park	25-50N-105W	12/20/47	4833	3771	Phosphoria	Swab 30 BPD	Surface
MONTANA NEW FIELDS										
15. Woman's Pocket	R. M. Amick	N. P. #3	Golden Valley	29-8N-21E	12/8	2119	2040	Amsden	113BPD	Surface
16. Melstone	Amerada Pet.	Haugen #1	Mussel-shell	23-10N-29E	10/2	4431	4218	Amsden	576 BPD	Seismic
17. Big Wall	Texas Company	N. P. #B-1	Mussel-shell	19-10N-27E	6/28	3139	3097	Amsden	9 BPD	Surface
COLORADO NEW FIELDS										
18. McElmo	West Natr. et al	MacIntosh #1	Monte-zuma	25-36N-18W	7/25	4965	1540	Shinarump	500 MCF	Surface
19. Dove Creek	" " " "	Driscoll #1	"	3-38N-19W	12/2	8286	5934	Paradox	438 BPD 5500 MCF	Surface Magnetic
20. Seely	G. L. Reasor	Burgess #1	Rio Blanco	26-3N-90W	8/5	3445	3445	Mancos	10 BPD	Surface
21. Pagoda	General Pet.	No.55-340	Routt	34-4N-89W	12/1	4900	4037	Shinarump	7700 MCF	Surface Seismic
UTAH NEW FIELDS										
22. Bar X	Stanolind	Government #1	Grand	12-17S-25E	7/15	4497	3625	Morrison	3750 MCFD	Surface
23. Boundary Butte	Western Nat. Gas Byrd-Frost, Eng.	English #1	San Juan	22-43S-22E	7/24	6090	4660	Hermosa	2300 MCF	Surface
WYOMING NEW POOLS										
24. Pilot Butte	Pacific Western	Stock #1	Fremont	23-3N-1W	11/16	6120	6120	Tensleep	360 BPD	Sub-sur.
25. Pilot Butte	Brinkerhoff	Heslin #1	Fremont	15-3N-1W	7/23	6308	6308	Tensleep	360 BPD	Non-technical
26. Elk Basin	Carter	Johnson - Watson 9	Park	8-57N-99W	8/31	4753	4753	2nd Wall Creek	30 BPD	Surface Sub-sur.
MONTANA NEW POOLS										
27. Cat Creek - Mosby Dome	Ike Taylor	Govt. 022005A	Garfield	26-15N-30E	7/10	1672	1670	Ellis	100 BPD	Surface
WYOMING SHALLOWER POOLS										
28. Winkleman	Stanolind	Tribal "A" #11	Fremont	18-2N-1W	9/22	3460	2921	Phosphoria	280 BPD	Surface Sub-sur.
29. Silvertip	Seaboard	No.Pac.#64-33	Park	33-58N-100W	4/25	8665	5992	2nd Wall Creek	92 BPD	Sub-sur. Seismic
30. Poison Spider	Morton Oil Co.	Government #22	Natrona	12-33N-83W	6/20	1335	558	Muddy	5 BPD	Surface Sub-sur.
UTAH SHALLOWER POOLS										
31. Boundary Butte	Byrd Frost et al	English #2	San Juan	22-43S-22E	11/13	4660	1514	Coconino	52½ Bbl. 13½ Hrs.	Surface
WYOMING DEEPER POOLS										
32. Torchlight	Stanolind	Orchard #2	Big Horn	24-51N-93W	4/11	3860	3635	Madison	300 BPD	Surface Sub-sur.
33. Medicine Bow	Ohio-California	Kyle #6	Carbon	26-21N-79W	6/17	6916	6860	Tensleep	840 BPD	Surface Sub-sur.
34. E. Allen Lake	Wasatch Pet.Co.	Mintze #1	Carbon	18-22N-78W	9/27	3965	3965	Tensleep	152 BPD	Surface Sub-sur.
35. Enos Creek	Ohio & Stanolind	L.U.Sheep #1	Hot Springs	25-46N-100W	12/29	7139	6488	Tensleep	160 BPD	Surface

SUCCESSFUL WELLS ROCKY MOUNTAINS - 1948 (Continued)

Name of Producing Area	Operator	Discovery Well	County	Location S -T- R	Date Completion	Total Depth	Discovery Depth	Name Productive Formation	Initial Production	Method of Discovery
36. Fourbear	Honolulu Oil	L.L.Anderson #3	Park	20-48N-103W	11/20	3931	3702	Madison	259 BPD	Surface Sub-sur.
37. Pitchfork	Husky	Unit #5	Park	11-48N-102W	4/14	4470	4355	Madison	200 BPD	Surface Sub-sur.
38. Lost Soldier	Sinclair	Unit "A" #77	Sweet-water	10-26N-90W	1/4	5031	5023	Madison	1045BPD	Surface Sub-sur.
39. Wertz	Sinclair	Wertz "D" #2	"	1-26N-90W	4/28	7193	6751	Madison	1145 BPD	Surface Sub-sur.
40. Lost Soldier	Sinclair	Drayton Cons. #2	"	3 26N 90W	6/30	6283	6026	Cambrian	720 BPD	Surface Sub-sur.
41. Wertz	Sinclair	Wertz #26	"	1-26N-90W	10/31	7789	7630	Cambrian	227 BPD	Surface Sub-sur.
42. Wertz	Sinclair	Wertz #22	"	1-26N-90W	2/28	6635	6494	Amsden	595 BPD	Surface Sub-sur.
43. Little Buck Creek	Continental	Elcu #12	Niobrara	26-36N-64W	7/28	6004	6004	Converse	275 BPD	Surface
44. No.Ant Hills	Ames et al	Govt. #3	Niobrara	1-37N-63W	5/28	5085	5015	Lakota	30 BPD	Surface
UTAH DEEPER POOLS										
45. Ashley Valley	Equity et al	Meagher #1	Uintah	23-5S-22E	10/9	4152	4152	Weber	260 BPD	Surface Sub-sur. Core Drlg.
WYOMING OUTPOSTS										
46. Steamboat Butte	Brinkerhoff	Tribal #3	Fremont	9-3N-1W	3/15	7076	7069	Phosphoria	387 BPD	Surface
47. Kirby Creek	Pacific Western	O'Mahoney #1	Hot Springs	17-43N-92W	7/4	3580	3580	Phosphoria	65 BPD	Surface
48. Horsecreek	General Pet.	Govt.#4-283	Laramie	28-17N-68W	7/9	5420	5420	Muddy	195 BPD	Surface Sub-sur.
49. W. Poison Spider	Pure	Unit #2	Natrona	11-33N-84W	12/19	9288	9288	Mesaverde	607 BPD	Sub-sur. Seismic
50. Gooseberry	General Pet.	Govt. #3-33	Park	33-47N-100W	11/6	6193	5893	Phosphoria	160 BPD	Surface
51. Silvertip	Seaboard	Govt.#37-28G	Park	28-58N-100W	9/13	8839	8665	Phosphoria	415 BPD	Seismic
52. Silvertip	Seaboard	No.Pac.#57-33	Park	33-58N-100W	11/14	9066	8580	Phosphoria	276 BO 22 Hrs.	Seismic
53. Church Buttes	Mountain Fuel	Unit #4	Uinta	29-16N-112W	9/7	13016	12994	Dakota	8000 MCFG 330 BPD	Seismic
54. Mush Creek	Texas Company	Updike #1	Weston	21-44N-63W	3/1	4275	4232	Newcastle	80 BPD	Non-Technical
55. Mush Creek	Brinkerhoff	Mondell #1	Weston	3-44N-62W	6/21	3067	3063	Newcastle	180 BPD	Trend
56. Mush Creek	Berwick et al	Michaels #1	Weston	19-44N-63W	7/22	4706	4640	Newcastle	50 BPD	Trend
MONTANA OUTPOSTS										
57. Cut Bank	Carter Oil Co.	Surber #4	Glacier	13-36N-6W	1/5	3182	3176	Madison	91 BPD	Sub-sur.
58. Cut Bank	Montana Power	Tribal 355 #3	Glacier	10-37N-7W	7/14	3670	3648	Madison	33 BPD 2 MCFG	Surface Seismic
59. East Utopia	Texas Company	Fenger #1	Liberty	14-33N-4E	2/16	2217	2182	Ribbon	2 BPD	Sub-sur.
60. East Utopia	Texas Company	Fenger #2	Liberty	13-33N-4E	7/29	2792	2414	Ellis (Sand)	17700 MCF	Sub-sur.
61. Whitlash	Western Nat. Gas.	Schafer #3	Liberty	14-37N-4E	8/11	2502	2355	Ribbon	50 BPD	Trend
62. Whitlash	"	Iverson #4	Liberty	9-37N-4E	1/13	2035	1950	Colorado	25 BPD 1500 MCF	Surface
63. Big Wall	Texas Company	Quinnell #1	Mussel-shell	24-10N-26E	12/6	2988	2950	Amsden	384 BPD	Surface Seismic
64. Big Wall	Texas Company	Zoerb #1	"	18-10N-27E	10/31	3617	2820	Amsden	150 BPD	Surface Seismic
65. Pondera Fld.	J. W. Lawrence	Morris #1-X	Pondera	22-27N-4W	5/3	2062	2062	Madison	12 BPD	Non-Technical
66. Pondera Fld.	Ted Hamley	Hirshburg	Pondera	23-27N-4W	1/20	2018	1915	Madison	20 BPD	Non-Technical
COLORADO OUTPOSTS										
67. Barker Creek	Delhi Oil	Barker No. 2	La Plata	3-32N-14W	12/1	9560	9370	Paradox	28500 MCF	Surface Sub-sur.
68. W. Hiawatha	Mtn. Fuel Supply	Lasher #3	Moffat	25-12N-101W	9/5	4601	4190	Wasatch	270 MCF	Surface Sub-sur.
69. Powder Wash	" " "	Donnell #3	Moffat	29-12N-97W	10/	2928	2928	Wasatch	3420 MCF	Surface Sub-sur.
70. Powder Wash	Mtn. Fuel Supply	Donnell #4	Moffat	29-12N-97W	12/4	5514	5075	Wasatch	468 Bbl. 380 MCF	Surface Sub-sur.
71. Maudlin Gulch	Texas Company	Unit #2	Moffat	27-4N-95W	9/7	6409	6409	Sundance	150 Bbl. Pump	Surface
72. Douglas Creek	Superior et al	Unit #3	Rio Blanco	1-3S-102W	9/5	5388	4547	Dakota	3640 MCF	Surface Sub-sur.
UTAH OUTPOSTS										
73. Boundary Butte	Byrd-Frost	Navajo #2	San Juan	25-43S-22E	8/21	5308	4450	Hermosa	9000 MCF	Surface

EXPLORATION

Statistics show that 277 exploratory wells were drilled in the Rocky Mountain region during 1948. Of these, 73 were successful. Classification of the exploratory wells and distribution by state are shown in Table I. Most of the new discoveries were from rocks of Permian and Pennsylvanian age. This is indicative of the drilling objectives most widely explored.

Classification of the new discoveries by age (exclusive of outpost wells and gas discoveries) is as follows: 2 Cambrian, 6 Mississippian, 15 Permian-Pennsylvanian, 5 Permian, 11 Cretaceous. Significant events in respect to future exploration in the Rocky Mountains are: (1) discovery of commercial oil in the Deadwood formation of Cambrian age at Lost Soldier and Wertz by the Sinclair-Wyoming Oil Company, Sweetwater County, Wyoming; (2) discovery for the first time in the Rocky Mountain region of oil production in the Mesa Verde formation of Upper Cretaceous age at West Poison Spider by the Pure Oil Company, Natrona County, Wyoming; (3) discovery of oil in the basal Amsden by The Texas Company at Big Wall and by the Amerada Petroleum Corporation at Melstone in Musselshell County provided new objectives for the central Montana area; (4) the trend by the industry toward deeper drilling in the central basin areas was marked with success by the Pure Oil Company's discovery in the Frontier formation at 14,309 feet at West Poison Spider in the Wind River Basin, Natrona County, Wyoming.

TABLE III

CREW WEEKS—GEOPHYSICS 1948

	1947		1948	
	Grav.	*Seis.*	*Grav.*	*Seis.*
Colorado	450	446	171	391
Utah	84	182	20	69
Montana	2	114	101	213
Wyoming	564	1,084	562	2,211
Nebraska	31	63	50	30
North Dakota	0	46	14	40
Total	1,131	1,935	918	2,954

Development drilling.—Development drilling proceeded rapidly during 1948, in many previously discovered pools. The Mush Creek pool in the Powder River Basin, Weston County, Wyoming, reportedly gained 88 new successful producers. By the end of the year, only 6 rigs were active at Rangely with a field total of 473 producing wells. The Weber sand development was nearing a close.

Geophysical.—Seismic activities reached a high peak in 1948, with a total of 2,954 crew weeks recorded. This compares with 1935 crew weeks in 1947. The largest gains in geophysical work were made in Wyoming and Montana with a

slight slackening of effort in Utah and Colorado. Table III summarizes some unofficial statistics for gravity and seismic activity.

Production.—Production statistics are difficult to obtain but distinct gains are evident for 1948. Preliminary figures are as follows.

CRUDE OIL PRODUCTION—ROCKY MOUNTAINS
(1,000 barrels)

State	*1946*	*1947*	*1948*
Wyoming	38,544	45,056	55,227
Montana	9,029	7,091	9,304
Colorado	11,591	15,682	17,792

Unit areas.—The approval given by the United States Government for unit agreements is of interest as a means of gaging the tempo of exploratory drilling.

TABLE IV
EXPLORATORY WELLS REACHING BASEMENT
ROCKY MOUNTAINS 1948

State	*Well*	*Location S-T-R.*	*Depth (Feet)*	*Formation Recorded*
1. South Dakota	Kucera 1 Fee	14-103N-71W	1,365	Granite
2. Colorado	Kerr-McGee and Phillips Unit 1	8-8S-102W	4,241	Pre-Cambrian
3. Colorado	Stanolind C.F.&I. 2	31-34S-63W	6,918	Pre-Cambrian
4. Colorado	Pure Unit 1	15-15S-104W	7,939	Pre-Cambrian
5. Colorado	Dinger Fee 1	35-2S-2E	3,241	Pre-Cambrian
6. Wyoming	Sinclair-Wertz 26	1-26N-90W	7,789	Pre-Cambrian
7. Wyoming	Amerada-Sohio Sullivan 1	17-26N-80W	3,322	Pre-Cambrian
8. Wyoming	Phillips Unit 1	11-26N-81W	3,676	Pre-Cambrian
9. Wyoming	General Pet. Patented 45-32P	32-30N-60W	7,048	Pre-Cambrian
10. Wyoming	Superior Unit 1	31-52N-101W	4,624	Pre-Cambrian
11. Wyoming	Barnsdall & Sohio Fox 2	7-57N-97W	5,738	Pre-Cambrian
12. Wyoming	Stanolind Tribal A 9	19-2N-1W	5,675	Pre-Cambrian
13. Montana	Ohio N.P. 1	9-10N-39E	6,050	Pre-Cambrian
14. Montana	Phillips Crow Tribe 52-34	34-6S-32E	4,470	Pre-Cambrian

As Federal lands cover great areas in the Rocky Mountain region, these statistics are significant. During 1948, approval by the Department of the Interior was given for 40 unit agreements distributed as follows: Wyoming 27, Utah 8, Colorado 4, Montana 1. This is comparable with 26 approvals obtained during 1947, distributed as follows: Wyoming 21, Colorado 3, Utah 1, Montana 1. The previous high was reached in 1937, when 33 units were approved.

The large number of exploratory wells drilled in the Rocky Mountains has provided a source of new data available for geologists concerned with regional and stratigraphic problems. Of the exploratory wells drilled in 1948, 14 are reported to have reached basement. These are listed in Table IV with the hope that this information will be of assistance to those interested.

SUMMARY BY STATES

Wyoming.—During 1948, Wyoming was the center of exploratory drilling in the Rocky Mountain region. Preliminary statistics show that 571 wells were

drilled, of which 147 have been classified as exploratory. Of these, 44 are listed as successful. This includes 14 new-field discoveries, 3 new-pools, 3 shallower-pools, 13 deeper-pool, and 11 outposts. The Powder River Basin is credited with 8 new-fields, 1 deeper-pool, and 3 outposts. In the Big Horn Basin, the following discoveries were made: 6 new-fields, 1 new-pool, 4 deeper-pools, 1 shallower-pool, 4 outposts. The Wind River Basin is credited with 1 new-field, 2 new-pools, 2 shallower-pools, and 2 outposts. One new-field and 2 deeper-pools were found in the Laramie Basin. In the Hanna-Saratoga basins, 5 deeper-pool discoveries were made. Three minor gas fields were reported in the state, 2 in the Big Horn Basin and 1 in the Hanna Basin. Of the several seemingly important discoveries, three are specifically mentioned here.

(1) *Silver Tip*, Seaboard Oil Company, 53–33 Northern Pacific, Sec. 33, T. 58 N., R. 100 W., Park County. This well produced on an initial test from the Phosphoria formation at the rate of 576 BPD with 3,000 MCF gas (H_2S) from the interval 8,496–8,550 feet. Additional productive zones were established later in 1948, in the Frontier and Tensleep formations.

(2) *West Poison Spider*, Pure Oil Company, Unit 1, Sec. 11, T. 33 N., R. 84 W., Natrona County. This well produced from the Frontier formation at 14,309 feet at the rate of 440 BPD, 43° gravity oil. This well at the time was the deepest well and the deepest production in the Rocky Mountain region. An outpost ½ mile northwest of the discovery found a new pay in the Mesa Verde formation at 9,230 feet which on flow test produced at the rate of 607 BPD, 48° gravity crude. Because of the new productive zone in the Mesa Verde, this well should establish a new exploratory trend for the state.

(3) During 1948, the Sinclair-Wyoming Oil Company evaluated its Lost Soldier and Wertz structures in Sweetwater County by deeper drilling. They were successful in establishing deeper pools in the Madison and Cambrian (Deadwood formation) in both fields and a lower Amsden pool at Wertz. The discovery in the Deadwood formation is reported as the first commercial Cambrian production in the Rocky Mountains. This is one of the most interesting developments for the year and as a new objective may possibly lead to deeper drilling in the future.

Montana.—The discovery of oil in the Kibbey sand by The Texas Company in the latter part of 1947, at Ragged Point, Musselshell County, stimulated interest in Montana. Two additional discoveries in the same county followed early in 1948: (1) The Texas Company's basal Amsden production at Big Wall and (2) a similar completion by the Amerada Petroleum Corporation at Melstone. Later in the year, The Texas Company extended the Big Wall discovery ½ mile northeast and ¾ mile southwest. The discoveries in Musselshell County helped initiate a large lease play in the central part of the state during the latter part of the year.

During the year, 57 exploratory wells were drilled in Montana including the following successful completions: 3 new-fields, 1 new-pool, 10 outposts. Failures

include 25 new-field wildcats, 3 deeper-pool tests, and 15 outposts. Unofficial reports list 331 drilling operations for the state in 1948.

Colorado.—Fifty exploratory wells were drilled in Colorado during 1948. Among these, 4 new-field and 6 outpost discoveries were made. A gas distillate discovery of possible major proportions at Dove Creek, Montezuma County, and a successful extension at Barker Creek directed particular attention to the southwestern part of the state. These successful wells stimulated interest in the Hermosa formation as a future objective. The gas discovery at Boundary Butte in southeastern Utah also had its effect on exploration in the Four Corners area. Two new gas fields are reported: (1) by General Petroleum Corporation at Pagoda in Routt County, and (2) by Western Natural and Byrd-Frost at McElmo in Montezuma County. Both fields produced from the Shinarump formation.

The most important discovery in Colorado is credited to Western Natural and Byrd-Frost at Dove Creek, Sec. 3, T. 38 N., R. 19 W., Montezuma County. Oil and gas were found in the Hermosa-Paradox formation at 5,934 feet. On production test, the well made approximately 200 BPD of 66° gravity oil and 5,000 MCF gas.

Utah.—Substantial commercial oil production was established in Utah for the first time during 1948, with the deeper-pool discovery in the Weber sand at Ashley Valley, Uintah County, and by the shallower-pool discovery in the Coconino sand at Boundary Butte in San Juan County. Commercial gas was also discovered in the Hermosa formation at Boundary Butte. This discovery produced at 28,000 MCF gas per day.

Additional encouragement for Utah occurred with the announcement by The California Company of favorable oil showings at Upper Valley, Garfield County. At the end of the year, this well had not been completed because of water difficulties.

Seventeen exploratory wells are credited to Utah. The discoveries include 2 new-fields, 1 shallower-pool, 1 deeper-pool, and 1 outpost. Failures include 11 new-field wildcats and 1 deeper-pool test.

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VOL. 33, NO. 6 (JUNE, 1949), PP. 837-840, 1 FIG., 2 TABLES

DEVELOPMENTS IN NEW YORK IN 1948[1]

EDWARD R. McAUSLAN[2]
Wellsville, New York

ABSTRACT

In the Oriskany gas sand area 22 wells were completed or drilling at the end of 1948 as compared with 27 in 1947. Fourteen of these wells were failures and 6 were in storage fields. There were no new discoveries. Total Oriskany gas produced was 2,185,102 MCF. Figure 1 shows Oriskany fields and drilling during 1948. Table I shows well records. Medina gas fields had 21 wells drilled during the year. Total Medina production data are not available. In the oil fields, 1,742 wells were drilled as compared with 1,700 completions in 1947. Daily average oil runs to pipelines was 12,329 barrels. Eighteen shallow Devonian wildcats were drilled, 3 of which showed slight amounts of oil. A basement test was started in Chenango County, in the eastern part of the state. Extensive geophysical work was done during the year.

Oriskany gas area (Allegany, Steuben, Tompkins, and Chemung counties).—By the end of 1948 in the Oriskany gas sand area of New York, 20 wells had been completed and 2 were drilling, a total of 4 less than in 1947. Of the completed wells 6 found gas, but since these 6 were in storage fields they can not be considered new production. Salt water was encountered in 8 wells, 5 were dry, and 1 made salt water and some non-commercial gas. The total drilled footage for Oriskany wells amounted to 66,005 feet; of which 12,614 feet was in storage wells, 18,645 feet in extension wells, and 34,746 feet in wildcat wells. The total number of feet drilled is nearly 20,000 less than in 1947, because more wildcat wells were drilled in areas where the Oriskany is relative shallow. Figure 1 shows drilling of 1948.

Medina gas sand area (Cattaraugus, Chautauqua, and Erie counties).—During 1948 there were 21 Medina sand wells drilled as compared with 23 in 1947. Four of these wells were dry. The other 17 were commercial producers in storage or existing gas pools. Four of the completed wells are shown in Table 1 and in Figure 1. No new Medina gas was found. The total Medina gas production figures are unavailable.

Oil-producing area (Allegany, Steuben, and Cattaraugus counties).—During 1948 there were 1,742 wells (estimated) drilled in proved fields, a slight increase over the 1,700 drilled in 1947.

Oil runs to pipelines amounted to 4,402,000 barrels. Total estimated production was 4,600,000 as compared with 4,505,813 barrels in 1947. The daily average production of 12,300 barrels was very close to the 1947 daily average of 12,349 barrels. Of this production, about 95 per cent was from secondary recovery operations and 5 per cent was natural production. The average price of crude increased from $4.21 in 1947 to $4.97 in 1948, reaching a high of $5.00 during the year, with a price of $4.50 at the end of the year.

Shallow wildcat wells.—As near as can be ascertained, 18 shallow wildcat

[1] Manuscript received, March 20, 1949.

[2] Geologist, Empire Gas and Fuel Company, Ltd.

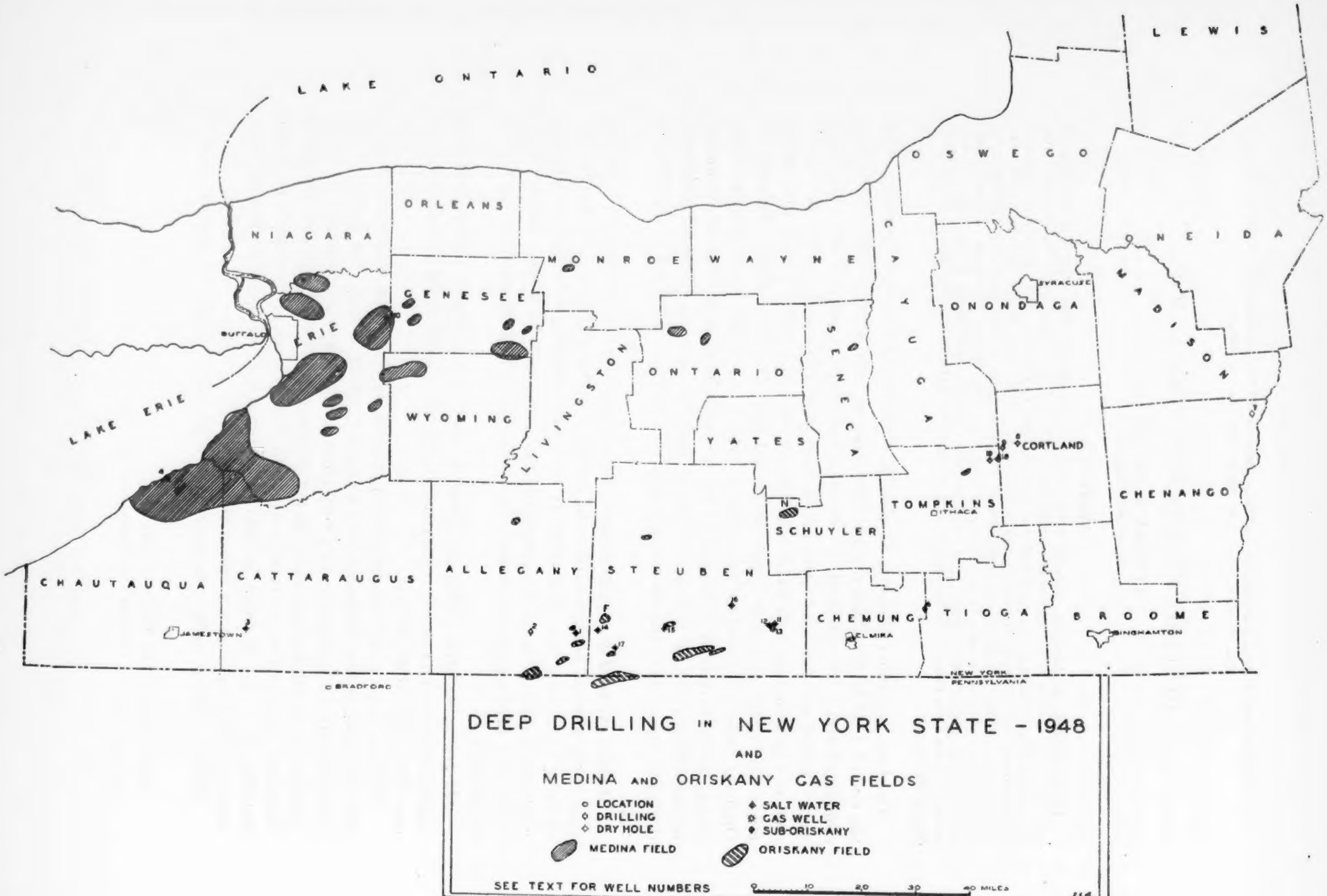
DEEP DRILLING IN NEW YORK STATE - 1948
AND
MEDINA AND ORISKANY GAS FIELDS
LOCATION
DRILLING
DRY HOLE
SALT WATER
GAS WELL
SUB-ORISKANY
MEDINA FIELD
ORISKANY FIELD
SEE TEXT FOR WELL NUMBERS
0 10 20 30 40 MILES
LAKE ONTARIO
LAKE ERIE
LEWIS
OSWEGO
ONEIDA
MADISON
ONONDAGA
SYRACUSE
CAYUGA
WAYNE
MONROE
ORLEANS
NIAGARA
GENESEE
ERIE
BUFFALO
WYOMING
LIVINGSTON
ONTARIO
SENECA
YATES
CORTLAND
CHENANGO
TOMPKINS
ITHACA
SCHUYLER
CHEMUNG
ELMIRA
TIOGA
BROOME
BINGHAMTON
STEUBEN
ALLEGANY
CATTARAUGUS
CHAUTAUQUA
JAMESTOWN
BRADFORD
NEW YORK
PENNSYLVANIA

Fig. 1

SEE TEXT FOR WELL NUMBERS 0 10 20 30 40 MILES

FIG. 1

TABLE I
DEEP WELL DEVELOPMENTS IN NEW YORK STATE IN 1948
(Elevations and Depths are in Feet)

County	Township	Operator	Farm	Well Map No.	Elevation	Tully	Onondaga	Oriskany	Total Depth	Results	Class
Allegany	Andover	Empire	Clark	1	2137	4209-4273	4317-4874	4874	4879	SW	WC
	Wellsville	Ranking	King	2	1479	3366-3419	3925			Drilling	WC
Cattaraugus	Randolph	Trio	Hotchkiss	3	1742	(Red Medina 4617, White Medina 4663)			4699	Dry	Ext
Chautauqua	Sheridan	Heintz	Niehaus	4		(Red Medina 1778, White Medina 1906)			1957	Gas	Ext
	Sheridan	Republic	Aldrich	5		(White Medina)			2121	Gas	Ext
Chemung	Van Etten	NYSNG	Kesselring	6	1077	1626-1712	2974-3033	3033-3104		Drilling	WC
Chenango	Columbus	BPC	Lobdell	7	1373					Drilling	WC
Cortland	Homer	NYSNG	Butler	8	1508	648-652	1930	No Sand	2214	Dry	WC
	Cortlandville	NYSNG	McCloy	9	1481	795-814	2082-2139	2139-2151	2235	Dry	WC
Erie	Newstead	Knapp	Feldman	10		(Medina)			1067	Gas	Ext
Schuyler	Tyrone	Keystone	Pulver	*	1434	993-1058	1897-1998	1998	2016	Gas	St
	Tyrone	Keystone	Litteer #3	*	1356	972-993	1871-1929	1929-1943		Gas	St
	Tyrone	Keystone	Litteer #4	*	1403	1009-1040	1931-1984	1984	1999	Gas	St
	Tyrone	Home	Litteer #5	*	1409	1015-1040	1909-1974	1974	1987	Gas	St
	Tyrone	Keystone	Deeming #3	*	1603	1128-1150	2014-2042	2042	2096	Gas	St
Steuben	Corning	NYSNG	Cole	11	1553	2852	4007-4070	4070-4104	4214	SW	WC
	Erwin	NYSNG	Keegan	12	1668	2974-3029	4041-4100	4100-4173	4184	SW	WC
	Erwin	NYSNG	Papa	13	1674	3012-3067	3990-4028	4028-4053	4063	Gas & SW	WC
	Greenwood	ADC	State #3	±	2168	3960-4019	4600-4676	4676-4686	4701	Dry	Ext
	Greenwood	ADC	Warriner #3	±	2069	3855-3910	4487-4535	4535	4541	SW	Ext
	Greenwood	Empire	Rogers	14	2190	4124-4170	4789-4834	4834	4840	SW	WC
	Greenwood	Home	Weber	±	2036	3814	4473-4512	4512	4516	Gas	St
	Jasper	NYSNG	House	15	1722	3740-3792	4532-4553	4553	4566	SW	Ext
	Thurston	Evjen	Knowles	16	1583	2795-2836	3622-3638	3638	3647	SW	WC
	West Union	Sylvania	McKeon	17	2083	4133	4802-4833	4833	4837	SW	Ext
Tompkins	Groton	NYSNG	Buchanan	19	1442	850-873	2138-2191	2191-2206	2306	Dry	WC
	Groton	NYSNG	Fouts	18	1323	714-734	1992-2059	2059-2070	2114	Dry	WC

Key to Operators: NYSNG - New York State Natural Gas Corporation
BPC - Bradley Producing Corporation
ADC - Appalachian Development Corporation

* On Map as Symbol N
± On Map as Symbol F

Key to Class: Ext - Extension
WC - Wildcat
St - Storage

wells were drilled, none of which was commercially successful, though 3 had small oil showings. Eleven of these 18 wells were drilled with the hope of extending the producing area of the Corbin Hill pool near Belmont, Allegany County. Table II shows the records of these wells.

Other developments.—An important test well (Map No. 7, Table I) was commenced near New Berlin, Chenango County, in the eastern part of the state. It is intended to drill to the basement complex if the well does not produce at shallower depth. The well is about 40 miles south of the pre-Cambrian line of outcrop and started in the Hamilton formation of the Devonian. The well was

TABLE II
SHALLOW EXPLORATORY DRILLING IN 1948

County	*Township*	*Operator*	*Well*	*Total Depth (Feet)*	*Total Depth Formation*	*Result*	*Class*
Allegany	Amity	Donahue	Eymer		Chemung	Dry	NFW
	Amity	Donahue	Windus		Chemung	Dry	NFW
	Amity	Wharton	Sears		Chemung	Oil showing	NFW
	Angelica	Fairman			Chemung	Dry	NFW
	Friendship	Fralich	Babcock	1,390	Chemung	Dry	NFW
	Friendship	Fralich	Weatherall	1,401	Chemung	Dry	NFW
	Friendship	Keenan	Kelly	1,410	Chemung	Dry	NFW
	Friendship	Keenan	Reynolds		Chemung	Dry	NFW
	Friendship	Leiderbach	Baker		Chemung	Dry	NFW
	Friendship	Leiderbach	Nickerson	1,500	Chemung	Oil showing	NFW
	Friendship	Warner	McCarthy	1,639	Chemung	Dry	NFW
	Friendship	Warner			Chemung	Dry	NFW
	Granger	Rexford	Atwood		Chemung	Dry	NFW
	Independence	Tower	Dibble	3,000	Portage	Dry	NFW
	Ward	Shaner			Chemung	Dry	NFW
	Wellsville	Fenner			Chemung	Dry	NFW
Cattaraugus	Elko	Fogle			Chemung	Dry	NFW
	Portville	Fralich	Sherry	1,853	Chemung	Oil showing	NFW

Key to Class: NFW—New-field wildcat.

drilling at 328 feet at the end of 1948. Prior to the location of the well, an airborne-magnetometer survey was made over the area.

Reflection-seismograph work with structure on the Oriskany sandstone and on deeper formations as the prime objectives was carried on extensively in the southwestern, central, and eastern parts of the state in the last half of the year. Five separate crews were reported working in the state at one time or another and 3 crews were operating at the end of the year.

The possibility of production from the Trenton and deeper formations have aroused the interest of many operators during the past year.

Leasing activity has increased greatly over 1947. These leases have been taken in areas near wildcat shallow-oil ventures, in larger blocks for Oriskany drilling, and in even larger blocks for sub-Oriskany possibilities.

BULLETIN OF THE AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS
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DEVELOPMENTS IN PENNSYLVANIA IN 1948[1]

CHARLES R. FETTKE[2]
Pittsburgh, Pennsylvania

ABSTRACT

Exploratory drilling in the shallow-sand territory of western Pennsylvania (Upper Devonian or higher) during 1948 led to the discovery of 5 new gas pools and one oil pool. None of these, however, seems to be significant in size. The total number of shallow wells drilled, exclusive of those drilled in connection with underground gas storage and secondary-recovery oil operations, was 10 per cent less than in 1947. In the Pennsylvania part of the Bradford oil field, which continued to be the most active area, 2,070 new wells were completed, as compared with 1,840 in 1947. About half of these were water-intake wells. The Bradford field accounted for 80 per cent of the total oil production in Pennsylvania during 1948. The average daily oil production in the state in 1948 was 35,206 barrels, as compared with 35,242 barrels in 1947.

Thirty new wells were completed to the deeper formations (Onondaga or deeper) as compared with 28 in 1947. Of these, two were drilled for gas storage purposes. Of the remainder, 9 were gas wells and 19 were dry holes. Two of the wells, located in Erie County, were completed as dry holes in the Corry Medina sand gas pool. They definitely established that this pool, discovered in 1948, is of only small extent. The greatest activity centered in the East Fork Oriskany sand gas pool of north-central Pennsylvania where 8 wells were completed, whose initial open-flow capacities ranged from 2 to 10 million cubic feet of gas per day. The limits of this pool have not been defined and this development, no doubt, will greatly stimulate further prospecting of the Oriskany underneath the Allegheny Plateau in central Pennsylvania.

The Cambro-Ordovician possibilities of the state received considerable attention during 1948. Several major companies conducted geological and geophysical surveys and one test on the Schellsburg dome east of the Allegheny Front in south-central Pennsylvania was underway at the end of the year.

INTRODUCTION

Little change occurred in drilling activity in the shallow-sand territory of western Pennsylvania (Upper Devonian or higher) during 1948. In all, 3,284 wells were completed, as compared with 3,247 in 1947. Of these, 481 were gas wells, 113 were oil wells, 208 were dry holes, 50 were drilled for gas storage, and 2,432 were drilled in connection with secondary-recovery oil operations. Thirty deep wells (Middle Devonian or deeper) were completed in 1948. Nine of these were gas wells, 2 were drilled for gas storage, and 19 were dry holes.

SHALLOW-SAND DEVELOPMENTS

Shallow-sand well completions in western Pennsylvania, exclusive of those drilled in connection with underground gas storage and secondary-recovery oil operations, are shown in Table I. During 1948, 802 such wells were drilled, of which 60 per cent were gas wells, 14 per cent were oil wells, and 26 per cent were dry holes. The 481 new gas wells had a total initial open-flow capacity of 102,615,000 cubic feet per day, as compared with the total initial open-flow capacity of 71,667,000 cubic feet of the 502 new gas wells completed in 1947.

[1] Published by permission of the director of the Pennsylvania Bureau of Topographic and Geologic Survey. Manuscript received, March 11, 1949.

[2] Professor of geology, Carnegie Institute of Technology, and cooperating geologist, Pennsylvania Topographic and Geologic Survey.

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TABLE I. Shallow-Sand Well Completions in Pennsylvania in 1948.*

County	Completions: Number of Wells	Completions: Average Total Depth (Feet)	Gas: Number of Wells	Gas: Average Initial Open-Flow (M.Cu.Ft. per day)	Gas: Average Total Depth (Feet)	Oil: Number of Wells	Oil: Average Initial Production Bbls. per day	Oil: Average Total Depth (Feet)	Dry: Number of Wells	Dry: Average Total Depth (Feet)
Allegheny	18	2865	14	154	2980	1	1.0	2245	3	2535
Armstrong	120	2964	105	108	3014	3	1.7	1525	12	2890
Beaver	4	1781	3	244	1690	0	---	----	1	2055
Butler	52	1680	14	70	1982	24	2.5	1489	14	1707
Cambria	2	4935	1	15	5724	0	---	----	1	4146
Clarion	39	2380	28	81	2567	2	1.5	1206	9	2057
Clearfield	12	3161	4	86	3065	0	---	----	8	3209
Elk	38	2357	24	91	2330	0	---	----	14	2403
Fayette	21	2265	14	144	2196	0	---	----	7	2403
Forest	32	2163	21	175	2097	0	---	----	11	2289
Greene	15	2760	11	128	2673	1	10.0	3345	3	2885
Indiana	48	3099	33	539	3008	0	---	----	15	3300
Jefferson	76	2734	57	163	2674	0	---	----	19	2917
McKean	148	2107	56	74	2148	56	2.0	1771	36	2542
Mercer	4	800	0	---	----	0	---	----	4	800
Potter	29	2487	17	107	2782	0	---	----	12	2070
Somerset	4	4349	0	---	----	0	---	----	4	4349
Tioga	1	1825	0	---	----	0	---	----	1	1825
Venango	16	1287	4	51	2021	8	.5	850	4	1425
Warren	17	1143	4	20	1872	12	2.0	850	1	1752
Washington	63	2456	38	854	2173	6	11.3	2741	19	2931
Westmoreland	43	2899	33	255	2835	0	---	----	10	3108
TOTAL	802	2459	481	213	2603	113	2.5	1601	208	2585

* Does not include wells drilled in connection with underground gas storage or secondary-recovery oil operations.

TABLE II. Shallow-Sand Wells Deepened in 1948.

County	Total: Number of Wells	Total: Average Amount Deepened (Feet)	Gas: Number of Wells	Gas: Average Initial Open-Flow (M. Cu.Ft.) per day	Gas: Average Amount Deepened (Feet)	Oil: Number of Wells	Oil: Average Initial Production (Barrels per day)	Oil: Average Amount Deepened (Feet)	Dry: Number of Wells	Dry: Average Amount Deepened (Feet)
Armstrong	20	1243	12	83	1597	0	----	----	8	713
Butler	4	572	2	20	611	1	6.0	121	1	947
Greene	2	759	2	520	759	0	----	----	0	---
Indiana	1	1629	1	28	1629	0	----	----	0	---
Washington	11	978	6	411	1201	1	.5	1338	4	554
Westmoreland	5	1737	4	56	2113	0	----	----	1	235
Total	43	1156	27	177	1451	2	3.25	729	14	670

The 113 new oil wells had a total initial production of 286 barrels per day, as compared with the total initial production of 518 barrels of the 208 oil wells completed in 1947.

Five new small gas pools were discovered, as follows: 1 in East Taylor Township, Cambria County; 1 in Bell Township, Clearfield County; 1 in Spring Creek Township, Elk County; 1 in Warsaw Township, Jefferson County; and 1 in Roulette Township, Potter County. Ten wells, averaging 2,101 feet in depth, were drilled for underground gas storage in Allegheny County; four, averaging 1,213 feet, in Elk County; 17, averaging 1,860 feet, in Greene County; 3 averaging 1,336 feet, in Jefferson County; 15, averaging 2,689 feet, in Washington County; and one, 2,926 feet deep, in Westmoreland County. Forty-three shallow-sand wells were deepened with the results shown in Table II.

The average daily oil production of Pennsylvania in 1948 was 35,206 barrels, as compared with 35,242 barrels in 1947. In the Bradford oil field, which includes the Bradford, Guffey, and Burning Well pools, 2,270 new wells were drilled, about half of which were water-intake wells, as compared with 2,140 in 1947, an increase of 6 per cent. Oil production in this field, 86 per cent of whose area is in Pennsylvania, decreased from a daily average of 31,814 barrels in 1947 to 30,529 barrels in 1948, or 4 per cent. Of the new wells, 2,070 were located in the Pennsylvania part of the field, and this part contributed 28,201 barrels of the daily average production. This represented 80 per cent of the total oil production of the state. One small new oil pool was opened in Lafayette Township, McKean County, near the southwestern edge of the Bradford pool.

In the Kane-Clarendon area of southwestern McKean County and eastern Warren County, 244 wells were completed in 1948, mostly in connection with water-flooding projects in the Clarendon pool of east-central Warren County. In the Venango district of northern Venango County and southwestern Warren County, 118 wells were drilled in 1948, as compared with 277 in 1947, a decrease of 57 per cent. Of these 52 were air-intake wells; 58 were oil wells; and 8 were dry holes, drilled and cored to delimit pools. Oil production in the middle and southwestern districts of Pennsylvania increased from a daily average of 6,217 barrels in 1947 to 7,005 barrels in 1948, or 13 per cent.

DEEP-SAND DEVELOPMENTS

The results of deep drilling in western Pennsylvania during 1948 are summarized in Table III. The locations of the wells are shown on the map in Figure 1. Of the 30 wells completed, 9 were gas wells, 2 were drilled for gas storage, and 19 were dry holes. No new deep-sand pools were discovered.

The Corry Medina sand gas pool in Wayne Township, Erie County, discovered in 1947, was only small in extent. Two additional dry holes in 1948 delimited production on the southeast and northwest sides. The limits of production on the northeast and southwest sides had already been determined in 1947.

One more gas well was completed in the Smith pool, the southernmost one

TABLE III. Deep Wells Completed in Western Pennsylvania in 1948.
(Elevations and depths are in feet.)

Map No.	County	Township	Well	Company	Location Latitude	Location Longitude	Elevation above sea level	Tully
1	Crawford	Beaver	Wilbur J. Bittel 1	Appalachian Dev. Corp.	1.90 mi. S; 41° 50' N.	2.11 mi. E.; 80° 30' W.	1036	
2	Crawford	East Fallowfield	Ellen Calvin 2	Sylvania Corp.	1.86 mi. N.; 41° 30' N.	1.58 mi. E.; 80° 20' W.	1343	3083-3118
3	Erie	Summit	Chester Fuhrman 1	Appalachian Dev. Corp.	1.79 mi. S; 42° 5' N.	1.09 mi. W.; 80° 00' W.	1194	1861-
4	Erie	Wayne	C. J. Follette 2	Pennsylvania Gas Co.	2.13 mi. S; 42° 00' N.	1.90 mi. E.; 79° 45' W.	1774	2903-2978
5	Erie	Wayne	A. D. Peterson 2 1	Pennsylvania Gas Co.	1.69 mi. S; 42° 00' N.	1.96 mi. E.; 79° 45' W.	1862	2970-3060
6	Fayette	Georges	William Hartman 1	Peoples Nat. Gas Co.	.09 mi. S; 39° 45' N.	.71 mi. E.; 79° 45' W.	2354	6560-6638
7	Fayette	Georges	A. J. Opperman 1	Orville Eberly, et al.	.18 mi. S; 39° 45' N.	.89 mi. E.; 79° 45' W.	2358	6390-6468
8	Fayette	Springhill	George Steve 1	Manufacturers Light and Heat Co.	.33 mi. S.; 39° 45' N.	.21 mi. E.; 79° 45' W.	2537	7353-7473
9	Fayette	Springhill	Allie May Martin 1	Peoples Nat. Gas Co.	.96 mil S; 39° 45' N.	.01 mi. W.; 79° 45' W.	2367	7078-7180
10	Fayette	Springhill	Paul Dunham 2	New Penn Dev. Corp., et al	.65 mi. S; 39° 45' N.	.33 mi. E.; 79° 45' W.	2320	6789-6912
11	Fayette	Springhill	J. R. Smiley 1	New Penn Dev. Corp., et al.	.50 mi. S; 39° 45' N.	.42 mi. E.; 79° 45' W.	2314	6605-6710
12	McKean	Lafayette	L. D. Wilson 18	South Penn Oil Co.	1.15 mi. N; 41° 45' N.	1.45 mi. E.; 78° 45' W.	1550	4296-4312
13	Mercer	North	Lowrie Henderson 1	United Natural GasCo.	2.85 mi. S; 41° 20' N.	2.00 mi. E.; 80° 05' W.	1480	3918-3955
14	Potter	Abbott	Pennsylvania State Lanus 1, Wt. 4689	Allegany Gas Co.	2.00 mi. N; 41° 35' N.	.59 mi. E.; 77° 50' W.	1941	5478-5531
15	Potter	Allegany	Merle Scoville 1	Appalachian Dev. Corp.	1.82 mi. S; 41° 55' N.	.62 mi. E; 77° 55' W.	2223	5025-5076
16	Potter	Allegany	Wm. Cobb 1	Sylvania Corp.	1.68 mi. S; 41° 55' N.	1.16 mi. E; 77° 55' W	2191	4975-5028
17	Potter	East Fork	Emporium Lumber Co. No. 13, Wt. 4701	Allegany Gas Co., et al.	2.69 mi. S; 41° 35' N.	.52 mi. E; 77° 55' W	1867	5410-5474
18	Potter	East Fork	Emporium Lumber Co. No. 14, Wt. 4714	Allegany Gas Co., et al.	1.44 mi. N; 41° 30' N.	1.70 mi. E; 77° 55' W	2119	5686-5750
19	Potter	Oswayo	Mrs. R. A. Goldsmith 1	New York State Nat. Gas Co.	1.12 mi. S; 42° 00' N.	.23 mi. W; 78° 05' W	1798	4055-4105
20	Potter	Sharon	Burt Dunshie 3	Allegany Gas Co.	2.66 mi. S; 42° 00' N.	.45 mi. W; 78° 05' W	1915	4315-4357
21	Potter	Wharton	State of Pennsylvania No. 1, Wt. 4734	Godfrey L.Cabot, Inc.	1.29 mi. N; 41° 30' N.	1.91 mi. W; 77° 55' W	2098	5662-5713
22	Potter	Wharton	State of Pennsylvania No. 2, Wt. 4734	Godfrey L.Cabot, Inc.	.82 mi. N.; 41° 30' N.	1.23 mi. E; 78° 00' W	2120	5597-5653
23	Potter	Wharton	State of Pennsylvania No. 4, Wt. 4921	Godfrey L.Cabot, Inc.	.41 mi. N.; 41° 30' N.	.66 mi. E; 78° 00' W	2104	5515-5600
24	Potter	Wharton	State of Pennsylvania No. 6, Wt. 4922	Godfrey L. Cabot, Inc.	1.00 mi. N; 41° 30' N	.70 mi. E; 78° 00' W	2115	5562-5632
25	Potter	Wharton	State of Pennsylvania No. 7, Wt. 4734	Godfrey L. Cabot, Inc.	1.37 mi. N; 41° 30' N	1.51 mi. E; 78° 00' W	1808	5338-5410
26	Potter	Wharton	State of Pennsylvania No. 8, Wt. 4921	Godfrey L.Cabot, Inc.	.30 mi. N; 41° 30' N	.17 mi. E; 78° 00' W	1987	5387-5459
27	Potter	Wharton	State of Pennsylvania No. 9, Wt. 4922	Godfrey L.Cabot, Inc.	.80 mi. N; 41° 30' N	.21 mi. E; 78° 00' W	1664	5091-5165
28	Tioga	Delmar	Edgar Willard 1	Wm. E. Snee, et al.	1.84 mi. N; 41° 40' N	1.84 mi. W; 77° 20' W	1484	4290-4318
29	Tioga	Jackson	C. W. Greenwalt 1	N. Y. State Nat. Gas Co. & Allegany GasCo.	1.74 mi. S; 42° 00' N	1.86 mi. W; 77° 00' W	1828	3328-3396
30	Tioga	Lawrence	Clarence Cooley 2	New York State Nat. Gas Co.	2.53 mi. N.; 41° 55' N	.26 mi. W; 77° 10' W	1720	3094-3153
31	Tioga	Lawrence	C. H. Van Zile 3	New York State Nat. Gas Co.	2.76 mi. S; 42° 00' N	1.03 mi. E; 77° 10' W	1438	2812-2878

TABLE III (Continued). Deep Wells Completed in Western Pennsylvania in 1948.
(Elevations and depths are in feet.)

Onondaga	Oriskany	Lockport	Medina	Total Depth	Date Completed	Results
2148-2405	2405-2413	3225-3240 black water		3327	2-18-48	16,000 cu.ft. gas at 2407 ft.; 6 bbls. s.w. per hr. at 2408 ft.; black water 3225-3240; abandoned.
3235-3430	3430-3448	show gas 4405: s.w. 4425-4435	Red 4663-4690 White 4690-4847	4896	5-15-48	500 gal. s.w. per hr. in Oriskany; 8,325 cu.ft.gas at 4405-4413; s.w. at 4425-4435; show gas at 4676'
2089-2325	2325-2339		Red 3245-3337 White 3337-3407	3485	3-29-48	5,000 cu.ft. gas and s.w. in Oriskany; s.w. at 2383 ft.; Black water at 3012; abandoned.
3150-3324	absent	Newburg 4129-4186	Red 4347-4392 White 4392-4505	4523	5-17-48	23 gallons s.w. per hr. in Newburg. 16,800 cu.ft. gas in Red Medina. Abandoned.
3222-3435	absent	Show gas & s.w 4172-4185	Red 4400-4467 White 4467-4567	4603	12-10-48	10,600 cu.ft. gas and s.w. at 4172-4185; 50,000 cu.ft. gas from Red Medina after shot. Abandoned.
7089- chert 7184-7533	7533-7636			7666	7-26-48	Deepened from 7636 ft. No additional gas.
chert 6943-				7230	3-2-48	1,500,000 cu. ft. gas at 6949-6966.
7942 chert 8005-8176	8176-8324			8788	1-23-48	Show of gas and s.w. at 8052. 130,000 cu.ft. gas after shot, blew down to 42,000 cu.ft.Abandoned.
7634- chert 7661-7834	7834-7902: 8102-			8253	3-6-48	Crossed fault near base of Oriskany; shows of gas in Onondaga chert and Oriskany sandstone; gas pocket at 8211 feet. Abandoned.
7677- chert 7710-7875	7875-7965			7969	3-9-48	Dry hole. Abandoned.
7755- chert 7794-7936	7936-8030			8104	6-1-48	Dry hole. Abandoned.
4660-4730	absent	5749-5907	Red 6165-6192 White 6192-6328	8002	8-4-48	Oswego sandstone, 7550-7700. Dry hole. Abandoned.
4124-				4245	11-23-48	57,000 cu.ft. gas in Venango 3rd sand at 1008 ft. Bottomed in Onondaga.
6290-6315	6315-			6463	8-17-48	Dry hole.
5643-5665	5665-			5667	3-15-48	300,000 cu.ft. gas at 5666 ft. 700,000 cu.ft. gas and s.w. at 5667; drowned out. Abandoned 4-7-48.
5595-5614	5614-			5620	8-28-48	50,000 cu.ft. gas and s.w. at 5619 ft. Abandoned.
6139-6150	6150-6195			6195	3-24-48	45,000 cu.ft. gas after shot, 6153-6163 ft.
6406-6414	6414-6432			6438	7-9-48	3,400,000 cu.ft. gas per day I.C.F. from Oriskany
4577-4633	4633-			4637	7-29-48	15,640 cu.ft. gas and salt water at 4636.
4866-4904	4904-			4917	2-19-48	S.w. rose 900 ft. in 15 hrs. from Oriskany.
6329-6340	6340-			6346	1-23-48	4,700,000 cu.ft. gas per day I.C.F. from Oriskany
6286-6302	6302-			6314	3-30-48	7,400,000 cu.ft. gas per day I.O.F, 6303-6314.
6215-6225	6225-			6232	9-21-48	10,600,000 cu.ft. gas per day I.C.F. 6228-6231 ft.
6248-6269	6269-			6283	6-17-48	4,700,000 cu.ft. gas per day I.O.F. 6275-6280.
6046-6056	6056-			6081	9-4-48	2,140,000 cu.ft. gas per day I.O.F., 3400 lbs. R.P., from Oriskany.
6085-6102	6102-			6115	10-28-48	9,400,000 cu.ft. gas per day I.O.F. 6109-6114.
5801-5817	5817-			5841	11-25-48	2,935,000 cu.ft. gas per day I.O.F., 3150 lbs. R.P., 5823 feet.
5208-5232	5232-5271			5352	9-14-48	Show of gas at 5335 feet. Abandoned.
4335-4368	4368-			4502	5-14-48	Show of gas and salt water in Oriskany. Abandoned
4022-4054	4054-			4074	2-28-48	Gas storage well.
3777-3806	3806-3843			3844	4-27-48	25,900 cu.ft. gas at 3809-3815. Abandoned.

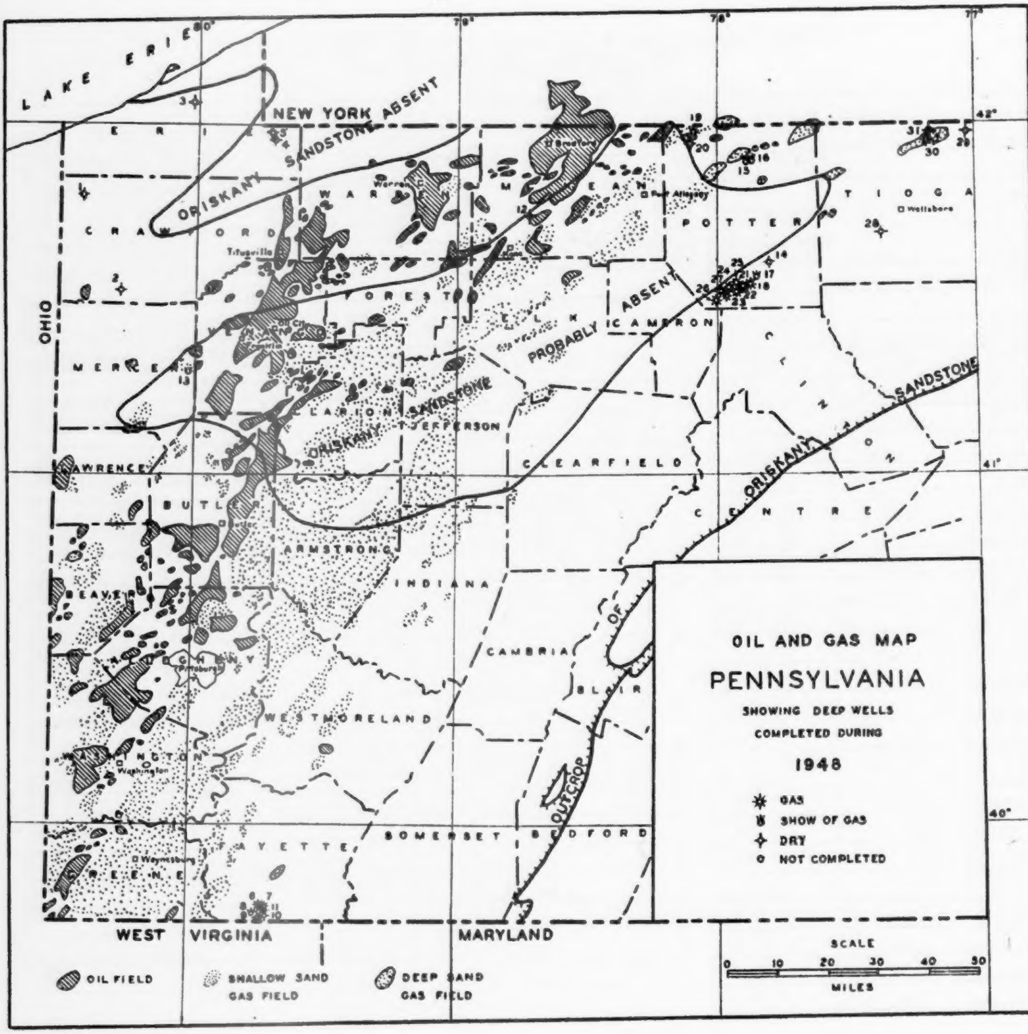
OIL AND GAS MAP
PENNSYLVANIA
SHOWING DEEP WELLS
COMPLETED DURING
1948
GAS
SHOW OF GAS
DRY
NOT COMPLETED
OIL FIELD
SHALLOW SAND GAS FIELD
DEEP SAND GAS FIELD
SCALE
MILES
LAKE ERIE
NEW YORK
ORISKANY SANDSTONE ABSENT
ORISKANY SANDSTONE PROBABLY ABSENT
ORISKANY SANDSTONE
OUTCROP OF ORISKANY SANDSTONE
OHIO
WEST VIRGINIA
MARYLAND
ERIE
CRAWFORD
WARREN
MC KEAN
POTTER
TIOGA
FOREST
ELK
CAMERON
MERCER
VENANGO
CLARION
JEFFERSON
CLEARFIELD
CENTRE
CLINTON
LAWRENCE
BUTLER
ARMSTRONG
INDIANA
BEAVER
ALLEGHENY
CAMBRIA
BLAIR
WESTMORELAND
WASHINGTON
FAYETTE
SOMERSET
BEDFORD
GREENE

FIG. 1

of the three gas pools comprising the Summit field in Fayette County. This did not appreciably extend the productive area. Four wells around the margins were dry.

The L. D. Wilson well No. 18 in Lafayette Township, McKean County, encountered no sandstone at the Oriskany horizon. Drilling was stopped after the well had passed through the Oswego sandstone of the Upper Ordovician without producing.

The Merle Scoville No. 1 and William Cobb No. 1 in Allegany Township, Potter County, represent unsuccessful tests of a detached fault block south of the Ellisburg Oriskany sand pool. Although some gas was encountered in the Oriskany sandstone, the wells were soon drowned out by salt water.

The greatest activity centered in the East Fork Oriskany sand pool in southern Potter County where 8 wells were completed, whose initial open-flow capacities ranged from 2 to 10 million cubic feet of gas per day. The pool, as now developed, extends 7 miles along the axis of the Marshlands anticline and has a maximum width of 4,000 feet. The limits of production thus far have been defined by dry holes and very small wells only at the northeast end. This development, no doubt, will greatly stimulate further prospecting of the Oriskany underneath the Allegheny plateau in central Pennsylvania.

The Edgar Willard well No. 1 in Delmar Township, Tioga County, represents another unsuccessful Oriskany test on the Wellsboro anticline and the C. W. Greenwalt No. 1 in Jackson Township, in the same county, on the Sabinsville anticline, 4 miles east of the Tioga field.

The Cambro-Ordovician possibilities in the state received considerable attention during 1948. Several major companies conducted geological and geophysical surveys and one test on the Schellsburg dome, east of the Allegheny Front in Napier Township, Bedford County, in south-central Pennsylvania, was underway at the end of the year.

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BULLETIN OF THE AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS
VOL. 33, NO. 6 (JUNE, 1949), PP. 848-849, 1 TABLE

DEVELOPMENTS IN OHIO IN 1948[1]

J. R. LOCKETT[2]
Columbus, Ohio

ABSTRACT

In all, 1,522 tests were drilled in Ohio during 1948, exclusive of holes drilled for gas storage. A total of 3,864,592 feet of hole was completed. No important new fields were discovered and extensions conformed to normal expectations. Holes drilled in the state during the year are given in table form by sands and counties.

Although shortages of material and equipment were reflected in field operations, the total of completions in Ohio during 1948 indicated an average year. No important new fields were discovered and extensions conformed with normal expectations. Interest in shallow development continued to center in the Berea fields in Meigs County where 47 oil wells, 10 gas wells, and 11 dry holes were completed. Activity in deeper drilling was principally in Muskingum and Perry counties where Clinton and Medina tests totaled 102 oil wells, 92 gas wells, and 91 dry holes. In Stark County, where 212 holes were drilled during 1947, the total number dropped to 161 in 1948.

Exclusive of holes drilled in areas reserved for gas storage, on which no statistics are available, 1,522 tests were completed as compared with 1,383 in 1947. Of these 493, or 33 per cent, were oil wells, 429, or 28 per cent, were gas wells, and 600, or 39 per cent were dry. Of the 760 Clinton completions, 173, or 23 per cent, were oil wells, 261, or 34 per cent were gas wells, and 362, or 43 per cent were dry.

Completions by sands and counties are given in Table I in which all sands above the Berea (basal Mississippian) are classed as shallow.

[1] Manuscript received, March 5, 1949.

[2] Ohio Fuel Gas Company.

TABLE I

YEAR 1948. NUMBER OF WELLS DRILLED, BY SANDS

County	Shallow			Berea			Ohio Shale			Oriskany			Newburg			Clinton			Trenton			Sub-Trenton			Total			Grand Total
	O	G	D	O	G	D	O	G	D	O	G	D	O	G	D	O	G	D	O	G	D	O	G	D	O	G	D	
ADAMS																												
ASHLAND				35	8	13							2				10	18							37	18	31	86
ASHTABULA																	1	1								1	1	2
ATHENS	47	8	21	5	4	4											2	4							52	14	29	95
AUGLAIZE																			3		1				3		1	4
BELMONT		1				3																				1	3	4
BUTLER																												
CARROLL				9		6												1							9		7	16
CLERMONT																												
COLUMBIANA	1			5	7	12						1													6	7	13	26
COSHOCTON											2	1	1			3	1	6							4	3	7	14
CUYAHOGA											14						14	7								28	7	35
DARKE																			1	1					1	1		2
FAIRFIELD																2	2	1							2	2	1	5
FULTON																												
GALLIA			1																								1	1
GEAUGA												1															1	1
GUERNSEY	1			2	10	6					2	2													3	12	8	23
HANCOCK																												
HARRISON						2																					2	2
HENRY																												
HOCKING																7	5	1							7	5	1	13
HOLMES					1	1										1	2	3							1	3	4	8
HURON																												
JACKSON		2																								2		2
JEFFERSON		1		2		9																			2	1	9	12
KNOX				3	1	3					1					21	7	22							24	9	25	58
LAKE																		2									2	2
LAWRENCE								1										6								1	6	7
LICKING				4				2	3					1	1	18	4	10							22	7	14	43
LOGAN																					2						2	2
LORAIN						2											20	23								20	25	45
LUCAS																												
MAHONING						1																					1	1
MEDINA				8	1	13						1		2			10	9							8	13	23	44
MEIGS	5	1	5	47	10	11		2	2	1		1													53	13	19	85
MERCER																			21		6				21		6	27
MONROE	33	6	19	10	21	14			1																43	27	34	104
MORGAN	4	1	7	3	3	3										6	9	12							13	13	22	48
MUSKINGUM		1		2												54	33	40						1	56	34	41	131
NOBLE	6	2	10	2	7	9																			8	9	19	36
OTTAWA																												
PERRY				13	8	11		1								48	59	51						1	61	68	63	192
PORTAGE												1				3		1							3		2	5
PUTNAM																			1	1					1	1		2
RICHLAND																												
ROSS																												
SANDUSKY																												
SENECA																												
SHELBY																												
STARK						2										6	62	91							6	62	93	161
SUMMIT										2		1			1		3	1							2	3	3	8
TRUMBULL										3	2														3	2		5
TUSCARAWAS				6		9											15	11							6	15	20	41
VINTON				2												1		1							3		1	4
WASHINGTON	27	17	34	3	3	5																			30	20	39	89
WARREN																				2						2		2
WAYNE					2	6								8		3	2	3							3	12	9	24
WOOD																												
DEFIANCE																					1						1	1
PIKE																								1			1	1
SCIOTO															1			1									2	2
WILLIAMS																					1						1	1
Totals	124	40	97	161	86	145		6	6	6	21	9	3	11	3	173	261	326	26	4	11			3	473	429	600	1,522

BULLETIN OF THE AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS
VOL. 33, NO. 6 (JUNE, 1949), PP. 850-852, 1 TABLE

DEVELOPMENTS IN WEST VIRGINIA IN 1948[1]

R. C. TUCKER[2]
Morgantown, West Virginia

ABSTRACT

In all, 934 wells were drilled in West Virginia during 1948, or 8 less than in 1947. There were 923 permits to drill or deepen, 53 less than in 1947. There were 1,132 wells abandoned under permit or abandoned under original drilling permit numbers; 310 more wells were abandoned in 1948 than in 1947. Wells completed were: gas, 590; oil, 131; oil and gas, 26; storage *et cetera*, 9; dry, 178. The 1947 totals were: gas, 644; oil, 93; oil and gas, 25; storage *et cetera*, 9; dry, 171. Wells ranged in depth from 283 to 8,942 feet, compared with 385 to 8,120 feet in 1947. Total footage drilled was 2,520,757 feet, compared with 2,570,198 feet in 1947. The average depth of wells was 2,699 feet, compared with 2,819 feet in 1947. The total daily initial volume of gas was 491,441 MCF, compared with 506,672 MCF in 1947. Range in size of gas wells, 6 to 24,000 MCF, compared with 10 to 18,151 MCF in 1947. Total initial daily oil, 2,478¾ barrels, compared with 1,567 barrels in 1947. Number of wells drilling or completions unreported at end of year, 333, compared with 310 in 1947. Preliminary estimates of production for 1948: gas, 221,130,000 MCF; oil, 2,695,000 barrels. Estimated number of producing wells at end of 1948: gas, 14,250; oil, 16,365. A table gives statistics by counties.

The table of oil and gas operations in West Virginia by counties in 1948 gives the salient facts regarding drilling results. Comparisons with 1947 figures are also shown in the bottom line of the table. Fifty-four less gas wells, 38 more oil wells, one more oil and gas well, and 7 more dry holes were completed in 1948 than in 1947, while the number of storage wells remained the same. Permits to drill or deepen issued by the State Department of Mines totaled 923, or 53 less than were issued in 1947. Total completions were 934 as against 942 in 1947. Seven counties accounted for 56 per cent (527) of the wells drilled, Wayne (115), Lincoln (87), Kanawha (79), Jackson (74), Wyoming (74), Ritchie (52), and Calhoun (46).

Drilling depths ranged from 283 to 8,942 feet, as against a range of 385 to 8,120 feet in 1947.

The total footage drilled decreased 49,441 feet, the total for 1948 being 2,520,757 feet as against 2,570,198 in 1948. The average depth (2,699 feet) is 120 feet less than in 1947 because of the smaller number of Oriskany wells completed and a comparatively large number of wells drilled in shallow territory.

The total initial daily gas volume in 1948 was 491,441 MCF, or 15,231 MCF less than in 1947. The average size of the gas wells was 833 MCF or about 33 MCF larger than in 1947.

The daily initial oil was up 911¾ barrels more than the 1947 figures (1,567). The range in size of oil wells was ½ barrel to 130 barrels, compared with ½ barrel to 380 barrels in 1947.

At the end of the year, 333 wells were drilling or unreported if completed. The writer wrote all the operators (205) whose wells (435) had not been reported asking the status of each well as of December 31, 1948. Completion reports were

[1] Manuscript received, March 23, 1949.

[2] Assistant State geologist.

TABLE I

OIL AND GAS OPERATIONS IN WEST VIRGINIA BY COUNTIES, 1948

County	Permits to Drill or Deepen	Abandonments	Completions						Range in Depth (Feet)	Total Footage Drilled	Average Depth of Wells	Total Initial Daily Gas (M. Cu. Ft.)	Range in Size of Gas Wells (M. Cu. Ft.)	Total Initial Daily Oil (Bbls.)	Range in Size of Oil Wells (Bbls.)	Number of Drilling Wells or Completions Not Reported at End of Year
			Gas Wells	Oil Wells	Oil and Gas Wells	Storage etc. Wells	Dry Holes	Total								
Barbour	9	—	8	—	—	—	3	11	3,826–4,545	47,069	3,621	3,191	62– 1,303	—	—	2
Boone	24	2	19	—	—	—	7	26	1,891–4,151	82,049	3,156	9,143	33– 6,191	—	—	10
Braxton	13	13	11	1	—	—	6	18	1,067–2,623	37,567	2,087	2,134	70– 561	6	6	11
Brooke	3	—	—	2	—	—	—	2	1,338–,1340	2,678	1,339	—	—	20	5– 15	1
Cabell	2	9	1	—	—	—	—	1	3,260	3,260	3,260	30	30	—	—	1
Calhoun	50	23	21	17	3	—	5	46	1,408–5,868	97,064	2,110	3,469	37– 475	221	1– 40	12
Clay	8	8	5	—	—	—	1	6	945–1,358	7,296	1,216	1,887	150– 675	—	—	3
Doddridge	7	111	3	2	1	—	3	9	792–2,800	16,045	1,783	551	100– 301	37½	0½– 30	1
Fayette	6	—	2	—	—	—	5	7	2,065–3,532	19,964	2,852	3,587	1,443– 2,144	—	—	1
Gilmer	30	39	15	2	1	4	4	26	1,428–2,859	48,883	1,880	3,645	32– 979	25	5– 10	8
Hancock	6	1	3	—	—	—	2	5	980–1,370	5,303	1,061	1,389	6– 1,368	—	—	2
Harrison	2	158	2	—	—	—	1	3	2,446–3,725	9,385	3,128	130	55– 75	—	—	—
Jackson	71	10	9	43	3	—	19	74	1,055–6,701	203,152	2,745	16,972	20–12,026	1,716½	0½–130	12
Kanawha	86	68	39	23	1	1	15	79	703–6,668	248,084	3,140	85,602	67–11,000	221	0½– 46	37
Lewis	13	72	11	—	—	1	1	13	1,798–4,729	44,947	3,457	1,157	15– 211	—	—	4
Lincoln	81	79	82	2	2	—	1	87	481–4,478	260,740	2,997	59,208	60– 6,357	9¾	0½– 6	31
Logan	23	—	20	—	—	—	6	26	1,798–3,975	73,663	2,833	23,291	29– 7,400	—	—	8
McDowell	9	—	4	—	—	—	3	7	3,600–7,175 (dg.)	35,032	4,379	5,212	231– 3,540	—	—	7
Marion	16	75	9	1	—	—	5	15	905–4,325	29,468	1,965	1,523	30– 452	—	—	5
Marshall	24	6	14	—	—	1	—	15	1,353–6,809	34,005	2,267	19,318	19– 6,286	—	—	9
Mason	9	—	3	—	1	—	3	7	1,673–4,120	24,454	3,493	241	15– 103	1	1	6
Mercer	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
Mingo	30	1	22	1	1	—	2	26	805–5,725	73,886	2,842	10,446	33– 1,302	123	23–100	15
Monongalia	2	82	—	—	—	—	1	1	2,231	2,231	2,231	—	—	—	—	1
Monroe	—	—	—	—	—	—	3	3	3,574–6,593	16,511	5,504	—	—	—	—	—
Nicholas	15	—	14	—	—	—	2	16	1,702–2,628	35,227	2,202	15,776	118– 4,029	—	—	5
Ohio	2	—	—	—	—	—	2	2	1,514–1,735	3,249	1,625	—	—	—	—	1
Pleasants	16	29	—	2	4	—	9	15	300–3,145	21,098	1,407	844	30– 464	96	1– 40	4
Preston	4	—	3	—	—	—	—	3	5,426–8,942	19,811	6,604	14,762	4,762– 5,000	—	—	3
Putnam	20	2	20	—	—	1	4	25	1,450–5,026	74,140	2,966	19,852	26– 5,026	—	—	4
Raleigh	33	—	18	—	—	—	4	22	1,614–7,173	67,460	3,066	11,770	112– 1,640	—	—	22
Randolph	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
Ritchie	48	60	18	15	5	—	14	52	430–2,684	101,723	1,956	28,260	50–24,000	84½	0½– 15	16
Roane	16	75	5	4	2	—	8	19	961–2,569	36,056	1,898	853	60– 330	35	2– 20	4
Taylor	5	3	2	—	—	—	5	7	900–2,400	12,599	1,800	2,342	198– 2,144	—	—	—
Tucker	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
Tyler	5	43	—	1	—	—	2	3	1,575–3,027	6,227	2,076	—	—	3	3	2
Upshur	15	1	18	—	—	—	—	18	1,231–4,820	68,341	3,797	4,868	56– 1,485	—	—	4
Wayne	102	1	110	4	—	—	1	115	558–7,542	328,890	2,860	61,377	21– 5,666	34	3– 15	35
Webster	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
Wetzel	7	108	1	1	1	—	2	5	2,500–3,148	12,178	2,435	137	33– 104	17	2– 15	8
Wirt	14	22	11	1	—	1	6	19	828–5,338	37,579	1,978	5,664	50– 2,588	2	2	1
Wood	30	31	4	9	1	—	12	26	283–6,627	45,585	1,753	5,153	40– 4,721	47¾	0½– 10	10
Wyoming	63	—	63	—	—	—	11	74	1,645–4,149	227,858	3,079	67,657	51– 4,788	—	—	29
Totals, 1948	923	1,132	590	131	26	9	178	934	283–8,942	2,520,757	2,699	491,441	6–24,000	2,478¾	0½–130	333
Totals, 1947	976	822	644	93	25	9	171	942	385–8,120	2,570,198	2,819	506,672	10–18,151	1,567	0½–380	310

obtained on 102 wells and depths on all but a few whose owners did not reply.

During the year, 1,132 wells were abandoned. To obtain this total, the total number of abandonment plats received from a plat service to the middle of September was added to the number of records of wells abandoned received from the State Department of Mines for which we did not have abandonment permit numbers.

The Silverton oil field, Jackson County, now has about 40 producers, the daily initial production averaging 40 barrels, with several wells now drilling there. A few Big Lime (Greenbrier) oil wells were drilled in Kanawha County.

Three additional gas wells were completed in Preston County in the Corniferous limestone and Oriskany sand.

One test is drilling in Wayne County in the Knox dolomite. It was 7,540 feet deep at the end of the year, or 376 feet below the top of the Knox dolomite, with some gas showing in Big Six sand, and showings of oil and gas in the Knox dolomite.

Preliminary estimates of production for 1948 are: oil, 2,695,000 barrels; gas, 221,130,000 MCF.

It is estimated that at the end of the year there were 14,250 gas wells and 16,365 oil wells producing in the state.

BULLETIN OF THE AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS
VOL. 33, NO. 6 (JUNE, 1949), PP. 853-862, 1 FIG., 6 TABLES

DEVELOPMENTS IN KENTUCKY IN 1948[1]

E. BOYNE WOOD[2]
Lexington, Kentucky

ABSTRACT

The total number of wells drilled in Kentucky in 1948 dropped 15.1 per cent below the 1947 total. With a decrease of 18.7 per cent in the number of oil wells drilled, production declined a little over 700,000 barrels for a 1948 total of approximately 8,926,000 barrels. Total open-flow gas development in 1948 was 287,814 MCF even with a 38.3 per cent decrease in the number of gas wells drilled. The total number of dry holes drilled increased only 5.4 per cent.

Of the 42 new discoveries, there were 12 new fields, 17 new pools, 9 new producing beds in old fields, and 4 extensions. By far the greatest number of these 1948 discoveries were made in the western part of the state.

There has been a great deal of deeper drilling activity, most of which took place in eastern Kentucky. In all, 34 deep wells were completed in 1948, 6 of which were successful St. Peter gas wells located in the Furnace field. There were two discoveries in the Knox dolomite which are reported producing small amounts of oil.

Considerable information is now available on these Lower Ordovician formations due to the stepped-up drilling campaign of recent years, and the correct interpretation of these data may well lead to more important discoveries.

INTRODUCTION

This report covers the development of the oil and gas resources of Kentucky in 1948. In all, 1,056 wells were drilled of which 394 were oil wells, 195 gas, and 467 dry holes. This was a decrease of 188 in the total number of wells drilled compared with the total for 1947. The number of oil wells drilled decreased by 91, gas wells by 121, and the total number of dry holes increased by only 24.

With a decrease of 18.7 per cent in the number of oil wells drilled, production declined 703,430 barrels, dropping from 9,629,616 barrels in 1947 to 8,926,430 barrels in 1948. Gas open-flow development in 1948 totaled 287,814 MCF in spite of a decrease of 38.3 per cent in the total number of gas wells drilled.

Of the 42 successful discoveries, 12 were new-field discoveries, 17 new-pool openers, 9 new producing beds, and 4 extensions. These discoveries range stratigraphically from Pennsylvanian sandstone to Lower Ordovician Knox dolomite, as shown in Table I.

DEEP DRILLING

There was probably more deeper drilling activity in Kentucky during 1948 than in any previous single year. In all, 34 Knox dolomite and St. Peter sandstone

[1] Manuscript received, March 17, 1949.

[2] Geologist, Kentucky Geological Survey.

Contributing authors: J. Al Brown, district geologist, Sohio Oil Company, Evansville, Indiana; Woodson Diamond, consulting geologist, Somerset, Kentucky; and Coleman Hunter, chief geologist, Kentucky West Virginia Gas Company, Ashland, Kentucky.

The writer wishes to acknowledge the valuable suggestions for the preparation of this paper given by Daniel J. Jones, State geologist, Lexington, Kentucky. Much credit is due the contributing authors for their excellent coverage of the developments in their sections of the state. Many operators contributed valuable information, among whom are: A. H. Carpenter, Winchester, Kentucky, who supplied data on the Furnace field wells; Frank Fisher, geologist, Ashland Oil and Refining Company, Ashland, Kentucky; and E. G. Dobrick, geologist, The California Company, Lexington, Kentucky, who furnished much of the information on the deep wells.

wells were drilled, of which 6 were successful gas wells and 2 successful oil wells Table II shows a list of the deep wells drilled in 1948.

Both of the Knox wells in Clay and Laurel counties completed by the Pure Oil Company and the Stanolind Oil and Gas Company in 1947 have been plugged and abandoned. The Hammons 1 in Clay County was abandoned because of collapsed casing due to a premature shot, and the McKnight 1 in Laurel County, after pumping 1,750 barrels of oil, because it was no longer considered a commercial well at the depth of 3,455 feet.

Two successful Knox wells were completed in Clinton County, one of which is located on a heretofore undrilled structure in the southeastern part of the

TABLE I
STRATIGRAPHIC RANGE OF 1948 DISCOVERIES

Formation	*New Fields*	*New Pools*	*New "Pays"*	*Extensions*	*Total*
Pennsylvanian sandstone	1	1			2
Chester sandstone	3	10	4	4	21
McClosky limestone	2		4		6
Osage limestone	1				1
Devonian	1				1
Corniferous limestone	2	3			5
Sunnybrook limestone	1	1			2
Stones River limestone		2			2
Knox dolomite	1		1		2
Total	12	17	9	4	42

county and is a possible new field opener although only an initial production of 17 barrels per day was reported. The other successful well was a Seventy-Six pool well which was deepened, producing an initial of 7 barrels of oil per day from the Knox.

A sandstone horizon has been encountered in the Knox in several rather widespread wells in eastern Kentucky. This formation is locally known as the "Maloney sand" and is a possible reservoir bed, although no oil has been produced from it as yet.

While the discovery well for the Furnace field was drilled and reported in 1947, the developments which have taken place at this deep St. Peter sandstone horizon are unique and interesting enough to warrant brief discussion in this 1948 report. At the close of the year a total of 10 wells had been drilled, 8 of which were successful gas wells, one of them reportedly testing up to 25,000 MCF. At present the gas is not being marketed but some of it is being used for repressuring near-by shallow Corniferous oil pools. Because of the high CO_2 content (42 per cent) plans are being made by A. H. Carpenter to construct a processing plant which will separate the CO_2 out, leaving methane which can then be used as a fuel. The carbon dioxide will also be marketed. The 1948 Furnace field completions are listed in Table II.

TABLE II

1948 DEEP TESTS INCLUDING FURNACE FIELD

Fee	County	Location	Top Knox	Total Depth	Result	Operator
Abner, C. C. 1	Powell	12-P-68	2126	2782	D & A	Kindred
Alexander Hrs.1	Estill	19-0-67	2120	2310	"	P. D. & R *
Barnes, J. D. 1	Clinton	15-B-55	1525	1891	17 B. O.	Diamond et al
Bond, N. U. 1	Jackson	25-L-66	2920	4257	D & A	P. D. & R *
Bradley 1	Clinton		1750	2106	Show Oil	
Bush, H. 1	Clark	5-R-65	860	1689	D & A	Allen & Caputo
Day, Golden 1	Wolfe	16-0-71	3312	3393	"	Rice & Long
Derickson, G. 1	Powell	20-Q-68	1967	2167	"	Al. Brauer
Guthrie, C. 1	Clinton	13-D-54	1619	2190	"	
Hall, J. 1	Powell	8-P-67	1783	3201	"	A. H. Carpenter
Houchen, B. 1	Barren	14-F-43	1756	2358	"	W. T. Rich
Huddleston 1	Clinton	4-C-53	2240	2400	Show Oil	
Hughes 1	Russell	13-F-55		1500	D & A	
Martin, J. 1	Lincoln	7-L-58	1325	1826	"	B. H. Putnam
Means, C. A. 1	Powell	6-P-69	2192	2205	"	Compton & Sipple
Motley 1	Allen	7-D-40	1855	1900	"	Vawter et al
Motley 1	Menifee	21-R-72	3170	3212	"	Groover et al
Noe, J. B. 1	Marion	13-M-52	1142	2116	"	A. H. Carpenter
Rawlings Cons. 1	Clay	5-1-69	3305	3603	"	Stanolind & Pure
Reddix, G. 1	Montgomery	4-0-68	2000	2668	"	Roy Davis et al
Reddix, G. 2	Montgomery	5-Q-68	2135	2800	"	Davis & Raydure
Riley, J. 2	Fleming	V-71	1590	2128	D & A	Kline
Seale, G. 1	Powell	3-Q-67	1672* *	1707	"	Endicott & Compton
Shoate, R. 1	Clinton	17-D-53	?	2100	7 B. O.	Bancroft-Mitchell
Stanford Creamery	Lincoln	17-M-58	1346	1782	Water Well	Stanford Creamery
Stearns C & L 1	McCreary	14-B-60	2770	2987	D & A	Al Brauer

FURNACE FIELD

Fee	County	Location	Top Knox	Total Depth	Result	Operator
Nichols, I. B. 1	Powell	21-P-68	2276* *	2352	25,000 MCF	A. H. Carpenter
Shouse, W. 1	Powell	25-P-68	2473	2504	3,700 MCF	Pet. Exploration
Smith, Noma 1	Powell	22-P-68	2160	2227	267 MCF	" "
Smith, James 1	Powell	22-P-68	2410	2468	15,000 MCF	A. H. Carpenter
Smith, James 1A	Powell	18-P-68	2285	2830	D & A	A. H. Carpenter
Tipton, J. 1	Estill	23-P-68	2672	2880	D & A	Pet. Exploration
Wasson, E. 1	Powell	20-P-68	2604	2871	Gas	A. H. Carpenter
Wise, H. 1	Powell	20-P-68	2482	2544	Gas	A. H. Carpenter

*PD&R - Patterson, Dyer & Roeder
* *St. Peter Sandstone

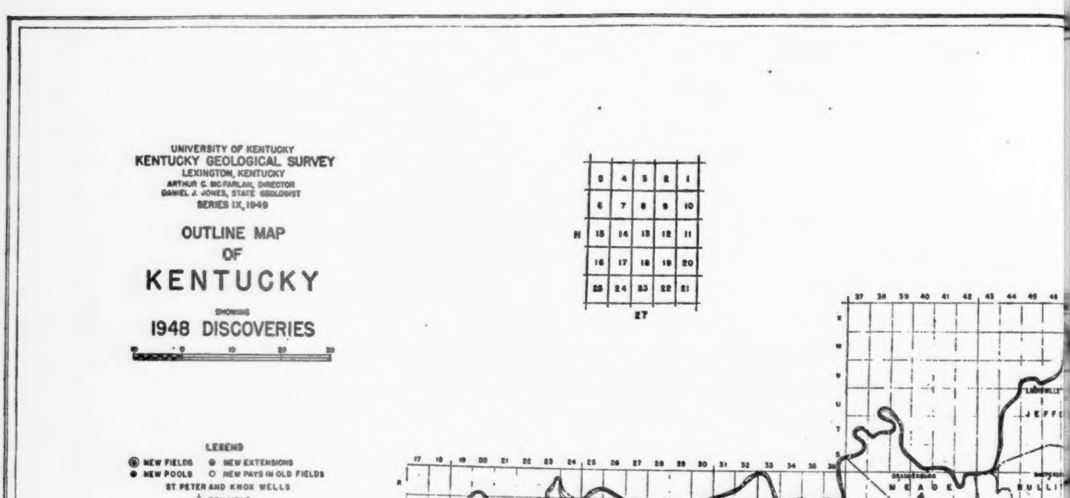


FIG. 1 (West half)

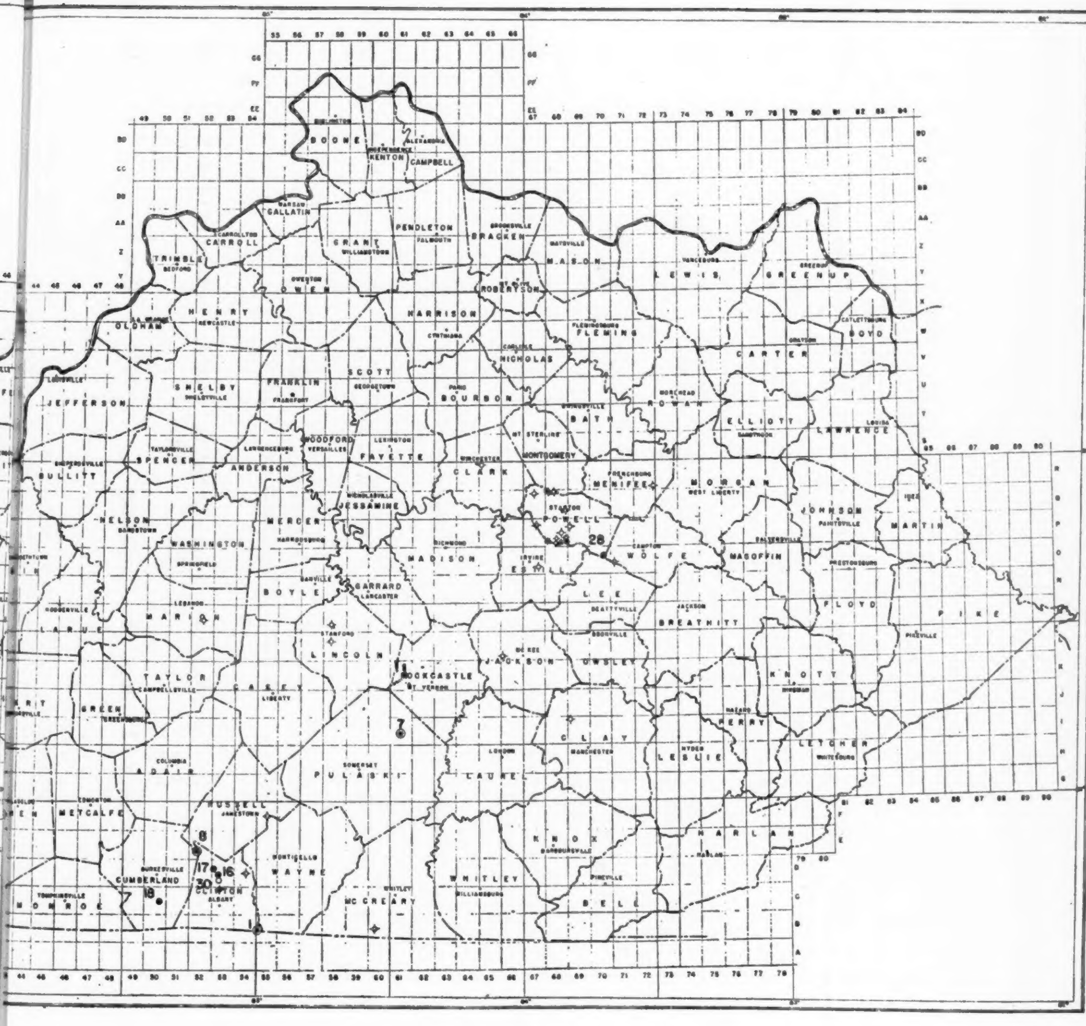


FIG. 1 (East half)

TABLE III

1948 NEW-FIELD DISCOVERIES

Map No.	Operator	Fee	Location	Formation	Total Depth	Field	Result	Comp. Date
	Clinton County							
1	Diamond et al	J. D. Barnes 1	15-B-55	Knox	1891'		IP 17 B.O.	3/13
	Henderson County							
2	Ashland-Basin	C. Crafton 1	1-0-25	Hardinsburg	1754'	Euterpe N.	IP 50 B.O.	11/17
3	Ashland et al	F. Crafton 1	10-0-24	Tar Springs	1708'	Anthoston	IP 15 B.O.	1/21
	Meade County							
4	George Baker	Tobin 1	8-Q-40	Osage Ls.	476'	Guston	IP 5 B.O.	2/18
	McLean County							
5	J. C. Miller & Ashland	Bennett 1	6-N-27	Cypress	1994'	Wyman	IP 240 B.O.	12/1
6.	Ashland-Basin	Sandefur 1	7-N-26	McClosky	2319'	Beech Grove	IP 95 B.O.	10/20
	Pulaski County							
7	Diamond & Carter	Lewis Sears 1	13-I-61	Corniferous	407'	Elrod	IP 3 B.O.	Apr.
	Russell County							
8	Shipley et al	B. Sloan 1	17-E-52	L. Sunnybrook	450'	Rockhouse Bottom	IP 120 B.O.	July
	Todd County							
9	Noah and Sons	Hollingsworth 1	11-C-29	Corniferous	1082'			
10	Ryan and Sharp	Geo. Kennedy 1	15-C-29	Devonian	1202'		2,000 MCF Gas	
	Union County							
11	Sun Oil Co.	Binford 1	23-O-19	Pennsylvanian Ss.	1420'	Morganfield S	IP 14 B.O.	4/1
	Webster County							
12	Shelton-Ashland	Mattie Ramsey 1	21-M-22	McClosky	3053'	Dixon	IP 26 B.O.	8/4

While the deeper drilling results have not met some operators' expectations, it can not be denied that both oil and gas have been produced. The Furnace field seems potentially capable of producing considerable quantities of gas from the St. Peter sandstone and several wells have produced oil from the Knox dolomite, though not in large quantities. Discovery of the "Maloney sand" establishes the presence of a possible reservoir bed within the Knox, and it may be that oil accumulation in commercial quantities will be found in this formation.

DEVELOPMENTS

WESTERN KENTUCKY

There was less drilling activity during 1948 in western Kentucky than during the previous year and oil production decreased. In all, 574 wells were drilled compared with 667 drilled in 1947. The number of oil wells drilled dropped from 333 in 1947 to 253 in 1948 and gas wells from 28 to 7. The number of dry holes drilled increased only from 306 to 314.

Most of the new discoveries were made in this part of the state. Nine of the 12 new fields, 11 of 17 new pools, 8 of 9 new producing beds in old fields, and all of the 4 extensions were discovered in western Kentucky. These discoveries ranged stratigraphically from oil in Pennsylvanian sandstones to a gas discovery in the Devonian. Most of the successful discoveries were made in the Chester formations.

The most outstanding successes seem to be in the south Morganfield area of Union County and in the Griffith area of Daviess County. Interest in the McClosky has been stimulated by a successful deepening in the Daviess County Pellville pool. Three gas discoveries were made with an initial open-flow development of 5,502 MCF.

SOUTH-CENTRAL KENTUCKY

The decrease in total number of wells drilled in south-central Kentucky was much greater than in any other section of the state. From a total of 222 wells drilled in 1947, the number in 1948 dropped to 152, for a difference of 70. This is a decrease of about 32 per cent as compared with an approximate decrease of 14 per cent in western Kentucky and 7 per cent in eastern Kentucky. There were 35 (28 per cent) fewer oil wells drilled, 34 (85 per cent) fewer gas wells and only one less dry hole.

Successful discoveries resulted in 3 new fields, 5 new pools, and 1 new "pay." These included successful completions in the Corniferous (Devonian-Silurian), upper and lower Sunnybrook (Trenton), Stones River, and Knox. The successful Knox completions are described in the section on deep drilling and are listed in Tables III and V. The high flush production from the Stones River has now ceased and only a few wells are pumping at this time. Production in south-central Kentucky in the last 3 months of 1947 was 160,000 barrels and for the same 3-month period in 1948 was only 121,169 barrels. This decrease of almost 39,000 barrels of oil was due mainly to the very short productive life of the Stones River wells.

TABLE IV

1948 NEW-POOL DISCOVERIES

Map No.	Operator	Fee	Location	Formation	Total Depth	Pool	Result	Comp. Date
	Allen County	Louis Miller 1	5-B-40	Corniferous	360'	Adolphus	IP 60 B.O.	Aug.
13	Barlow & McGinley	(Mrs.) J. Reed 1	20-D-40	Corniferous	365'	Reed	IP 7 B.O.	July
14								
	Breckinridge County							
15	Ancheny et al	Clark 1	8-N-35	Jackson Sd.	518'	Vankant	2,000 cu.ft.	3/3
	Clinton County							
16	Carter & Diamond	Levi Hudson 1	14-D-53	Stones River	1226'	Hudson	IP 300 B.O.	June
17	Carter & Diamond & Morgan Coal Co.	Robert Johnson 1	6-D-53	Stones River	1236'	Johnson	IP 130 B.O.	Mar.
	Cumberland County							
18	A. G. Greenup	Lang 1	12-C-50	U. Sunnybrook	340'	Kettle	IP 40 B.O.	July
	Daviess County							
19	F. M. Ashby	St. Peter Church 1	4-P-28	Palestine	975'	Griffith	IP 220 B.O.	12/22
20	Sargent et al	Barnett 1	11-P-27	Palestine	1051'	Birk City	IP 75 B.O.	12/15
21	Tuttle et al	A.Roach 1	7-P-28	Palestine	992'	Griffith	IP 50 B.O.	8/23
22	J. Akers et al	J. Bosley 1	14-P-28	Jackson Sd.	1513'	Griffith	IP 75 B.O.	12/1
	Henderson County							
23	Ashland-Basin	R. L. Holliday 1	20-0-24	L. O'Hara	2616'	Niagra New	IP 36 B.O./6w	5/9
24	Carter Oil Co.	A. E. Melton 1	14-0-23	Waltersburg	1761'	Cairo No.	IP 110 B.O.	5/26
	McLean County							
25	Miller, Shiarella and Ashland	Stratton 1	16-N-27	Jackson Sd.	1996'	Guffie	IP 120 B.O.	4/1
26	H. Compton	S. Kirtley 1	19-L-28	Benoist	1793'	Island	IP 75 B.O.	1/12
27	Benedum & Trees	McManama 1	22-L-28	Bethel	1883	Island Ext.	IP 15 B.O.	6/26
	Powell County							
28.	C. Ledford	J. B. White 1	9-0-70	Corniferous	1203'		IP 50 B.O.	7/30
	Union County							
29	Bozarth	Hite-Proctor 1	4-P-20	Pennsylvanian Ss.	920'	Caney Mound	IP 12 B.O./4w	6/16

TABLE V

Ss.

TABLE V

1948 NEW PRODUCING BEDS IN OLD FIELDS

Map No.	Operator	Fee	Location	Formation	Total Depth	Field	Results	Comp. Date
	Clinton County							
30.	Bancroft-Mitchell	Rufus Shoate 1	17-D-53	Knox	2219'	Seventy six	IP 7 B.O./w	Apr.
	Daviess County							
31.	Great Lakes Carbon Co.	Hazel Aud & Miller 2	25-P-33	McClosky	760'	Pellville	IP 150 B.O.	2/25
32.	Sohio Oil Co.	M. Sauer 2	10-P-27	Jackson Sd.	1810'	Birk City	IP 70 B.O.	8/8
	Henderson County							
33.	Clarence Wood	Fee 13	16-Q-20	McClosky	2620'	Geneva	IP 61 B.O./10w	9/1
	McLean County							
34.	Miller-Shiarella and Ashland	Tichenor 2	20-N-27	Jackson Sd.	1675'	Guffie	IP 250 B.O.	12/15
35.	Miller-Shiarella and Ashland	Galloway 1	21-N-27	McClosky	1900'	Guffie	IP 10 B.O.	12/15
36.	Miller-Shiarella and Ashland	Wiggins-Iglehart Comm. 3	19-N-27	Hardinsburg	1780'	Guffie	IP 24 B.O.	12/15
	Union County							
37.	Sun Oil Co.	L. Binford 2	23-O-19	Waltersburg	1809'	Morganfield S.	IP 175 B.O.	5/12
38.	Sun Oil Co.	W.A. & Nance Anderson 1	23-O-19	McClosky	2674'	Morganfield S.	IP 42 B.O.	6/16

TABLE VI

1948 EXTENSIONS

Map No.	Operator	Fee	Location	Formation	Total Depth	Field	Results	Comp. Date
39.	**Daviess County**							
39.	Sohio Oil Co.	Hayden 1	8-N-27	Bethel	1838'	Cleopatra	IP 45 B.O.	2/9
40.	Tuttle et al	Berry 1	17-P-29	Waltersburg	1102'	Owensboro	IP 10 B.O.	10/27
	Henderson County							
41.	W. Chenault	G. Priest 1	18-P-26	Tar Springs	1490'	Hebbardsville	IP 70 B.O.	7/7
	Hopkins County							
42	Alsworth et al	L. Loving 1	1-K-25	Tar Springs	2911'	Hanson	3,500MCF	1/10

EASTERN KENTUCKY

While the total number of wells drilled in eastern Kentucky decreased from 355 to 330, the number of oil wells increased from 27 in 1947 to 51 in 1948. The number of gas wells dropped from 248 to 182 and dry holes increased from 80 to 97.

Only one new discovery was made in this part of the state, most of the activity being confined to the development of the Big Sandy Devonian shale gas field and the Royalton gas field which is producing from the Big Six (Silurian). Open-flow gas development totaled 226,000 MCF, more than half of which was developed from the Big Six sandstone of Magoffin County.

One new pool was opened in the Corniferous in Powell County, the discovery well having an initial production of 50 barrels of oil. Deeper drilling to the St. Peter and Knox was also of interest in this section.

GEOPHYSICAL ACTIVITY

No geophysical activity was reported in western or south-central Kentucky in 1948. However, in eastern Kentucky The California Company had one seismic crew in the field in Estill, Powell, Madison, and Garrard counties.

BULLETIN OF THE AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS
VOL. 33, NO. 6 (JUNE, 1949), PP. 863-865, 1 FIG., 1 TABLE

DEVELOPMENTS IN TENNESSEE IN 1948[1]

H. C. MILHOUS[2]
Nashville, Tennessee

In Tennessee during 1948, there were 67 wells completed as compared with 30 for the preceding year. Of these 67 completions, 12 were commercial producers at the end of the year. In addition to these, 2 short-lived producers had been abandoned and 2 others had not been thoroughly tested. Ten wells were drilling as the year closed; one has since been completed as an oil well and another

TABLE I

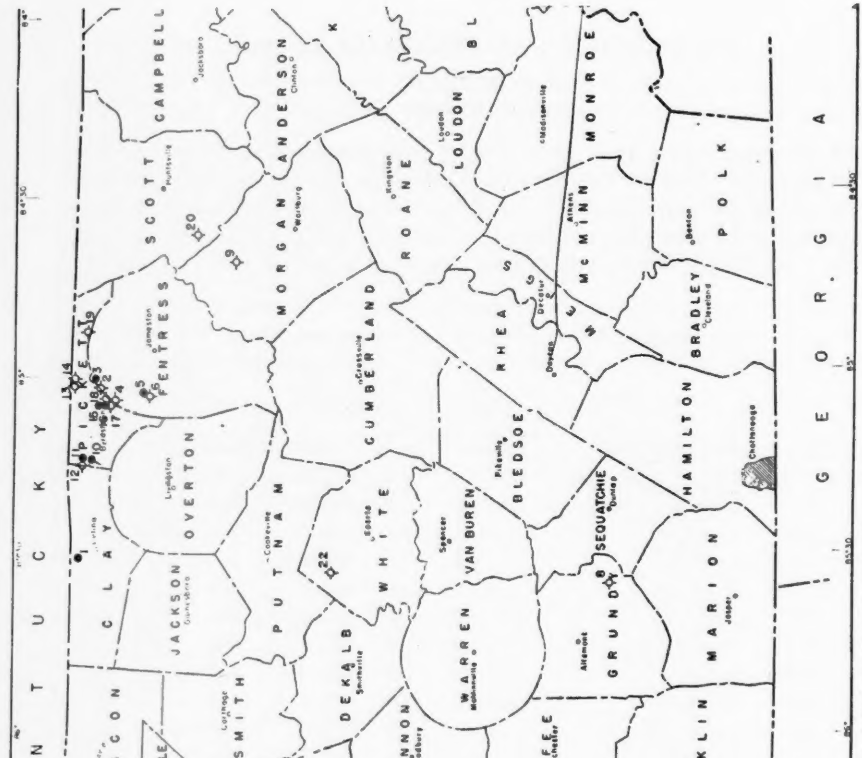
IMPORTANT WILDCATS DRILLED IN TENNESSEE IN 1948

Map No.	*County*	*Operator and Well*	*Section Township Range*	*Total Depth (Feet)*	*Surface Formation*	*Deepest Formation Tested*	*Initial Production (Barrels)*
1	Clay	Overstreet & Sparks J. H. Overstreet 1	20-B-48E	685	Trenton (U)	Stones R. (U)	60
2	Fentress	Thorton, Edwards, Lancaster Wm. Gilreath 1	8-A-54E	2,004	Miss. (L)	Knox (U)	0
3	Fentress	Turner Bros. & Shaner Fred Johnson 1	10-A-54E	1,996	Miss. (L)	Knox (U)	60
4	Fentress	Peters & Nye J. A. Fitzgerald 1	17-A-54E	1,905	Miss. (L)	Knox (U)	0
5	Fentress	Dewey Carr Bowden Heirs 1	13-1S-54E	1,723	Miss. (L)	Knox (U)	25
6	Fentress	E. Whitcher Alonzo Hinds 1	17-1S-54E	2,004	Miss. (L)	Knox (U)	0
7	Giles	Putnam et al. Earl Zuccarello 1	3-15S-29E	1,000	Trenton (L)	Knox	0
8	Grundy	Magnolia Petr. Co. W. H. Patterson 1	15-14S-48E	4,413	Penn. (L)	Knox	0
9	Morgan	E. P. Jarvis Summers 1	1-4S-58E	1,450±	Penn. (L)	Miss.	0
10	Pickett	Clarence Eleson Jouett Amonett 1	25-B-52E	1,800	Miss. (L)	Knox (U)	5[1]
11	Pickett	Clarence Eleson Jouett Amonett 2	25-B-52E	815	Miss. (L)	Stones R. (U)	20[1]
12	Pickett	Clarence Eleson B. C. Arney	25-5-52E	2,200	Miss. (L)	Knox (U)	0
13	Pickett	Woodson Diamond E. A. Barnes 1	19-B-54E	1,923	Miss. (L)	Knox (U)	Sma
14	Pickett	Woodson Diamond E. A. Barnes 2	20-B-54E	2,000	Miss. (L)	Knox (U)	0
15	Pickett	Talbot & Mitchell Ben Grace 1	6-A-54E	793	Miss. (L)	Trenton	26[1]
16	Pickett	Alvin C. York J. C. Crouch 1	15-A-54E	1,514	Miss. (L)	Stones R. (L)	20[1]
17	Pickett	Myers et al. Mrs. Ed. Storie 1	15-A-54E	2,223	Miss. (L)	Knox (U)	0
18	Pickett	Rodgers Bros. Edd. Johnson 1	18-A-54E	1,716	Miss. (L)	Knox (U)	0
19	Pickett	R. H. Norris Stearns Coal & Lbr. Co. 1	3-A-56E	1,500	Penn. (L)	Miss. (L)	0
20	Scott	Russell Producing Co. Fee 1	2-3S-59E	1,965	Penn. (L)	Miss. (L)	0
21	Sumner	J. W. Cook Fee 1	10-B-39E	120	Miss. (L)	Silurian	10[1]
22	White	C. L. Williams Hellis Irwin 1	23-6S-48E	2,300	Miss. (Mid)	Knox (U)	0
23	Wilson	Curtis Kinard et al. C. C. Talley 1	7-4S-40E	2,003	Stones R. (U)	Knox (U)	0

[1] Approx.

[1] Manuscript received, March 3, 1949.

[2] Assistant geologist, Tennessee Division of Geology. The writer wishes to express appreciation for the assistance of H. B. Burwell, State geologist of Tennessee, and for the cooperation of the drillers, operators, and refiners who furnished valuable information.



IMPORTANT WILDCATS DRILLED IN TENNESSEE IN 1948

LEGEND

● Oil well

✧ Dry hole

Oil well, temporarily abandoned

FIG. 1

is reliably reported to be a successful well. The total footage drilled during the year was almost 75,000, the greatest footage for any year in the history of the state.

Following the completion of the first commercial well in the Knox dolomite, Alvin C. York's Huff No. 2, discovered in 1947, 18 wells were drilled into the Knox last year. Two of these, both in Fentress County, made commercial wells while a third well, in Pickett County, is still doubtful although it encountered free oil in the Knox.

The deepest test drilled was the Magnolia Petroleum Company's Patterson No. 1 in Grundy County. It started in the Lower Pennsylvanian and penetrated approximately 1,500 feet of Knox dolomite but was dry and abandoned at the total depth of 4,413 feet, the second deepest test ever completed in the state. An oil showing was reported at 1,367–1,386 feet and a gas showing at 1,898–1,904 feet.

Two major oil company farm-outs were drilled, one in Giles County (total depth, 1,000 feet) and one in Maury County (total depth, 1,200 feet). Both were unsuccessful but a location in Giles County for a third farm-out had been made by December with a spudding date set for the early part of 1949.

The greatest concentration of drilling for the year was in the Kettle Creek-Pine Branch area of Clay County in the vicinity of the old Cordell Hull field. This activity followed the successful completion of Overstreet and Sparks' J. H. Overstreet No. 1 in March. Thirteen wells were drilled; 6 were still producing at the end of the year; and one had been abandoned. The producing strata ranged in depths from 478 to 685 feet below the surface or from 47 to 265 feet below the top of the Carters limestone.

PRODUCTION

OIL

Oil production from new wells during 1948 was in excess of the state's total production from both old and new wells in 1947. The total number of barrels produced in the year ending December 31, 1948, was 19,485, or slightly more than twice the production for 1947. Wells producing at the end of 1947 continued producing during the past year and their total output showed a small increase.

GAS

Total gas production was 157,500,000 cubic feet. Of this figure, 145,000,000 cubic feet came from the Russell Producing Company's wells in Scott and Morgan County, and the remainder from the 8 Jamestown Gas Company's wells in Fentress County.

Important wildcat wells drilled in 1948 are listed in Table I and Figure 1 shows their locations.

BULLETIN OF THE AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS
VOL. 33, NO. 6 (JUNE, 1949), PP. 866-876, 2 FIGS., 9 TABLES

DEVELOPMENTS IN ILLINOIS AND INDIANA IN 1948[1]

ALFRED H. BELL,[2] R. E. ESAREY,[3] AND B. E. BROOKS[3]
Urbana, Illinois, and Bloomington, Indiana

ABSTRACT

In all, 3,571 wells were drilled for oil and gas in Illinois and Indiana in 1948 as compared with 2,727 in 1947, an increase of 31 per cent. Total oil production decreased a fraction of 1 per cent from 72,901,000 barrels in 1947 to 72,480,000 barrels in 1948. Wildcat drilling increased from 792 completions in 1947 to 955 completions in 1948. Fifty-one new pools, 63 extensions, and 48 new producing zones were discovered in the two states in 1948.

Most of the discoveries in 1948 were in Mississippian formations but the Devonian limestone produced oil in five new pools, three in Indiana (Spring Hill in Vigo County and Wilfred and Marts in Sullivan County), and two in Illinois (Assumption and Assumption North, both in Christian County).

INTRODUCTION

In Illinois and Indiana, 3,571 wells for oil and gas were drilled in 1948 as compared with 2,727 in 1947, an increase of 31 per cent. Total oil production decreased a fraction of 1 per cent, from 72,901,000 barrels in 1947 to 72,480,000 barrels in 1948. Wildcat drilling increased from 792 completions in 1947 to 955 completions in 1948. Fifty-one new pools, 63 extensions, and 48 new producing zones were discovered in the two states in 1948.

Most of the discoveries in 1948 were in Mississippian formations but the Devonian limestone produced oil in five new pools—three in Indiana and two in Illinois. Oil production in a Silurian coral reef was developed in the McKinley pool in Washington County, which previously produced from the Benoist sand in the Chester series. Oil production from Ordovician limestone was developed with the discovery of the Craig pool in Perry County, Illinois, and the drilling of a number of "Trenton" wells in the Centralia and Shattuc pools in Clinton County and in the old "Trenton" field of northeastern Indiana.

The details of development are discussed separately for Illinois and Indiana.

ILLINOIS

By Alfred H. Bell

In Illinois 2,489 wells were completed for oil and gas in 1948, an increase of 22 per cent from 1947. Drilling resulted in 1,285 oil wells, 10 gas wells, and 1,189 dry holes. Of the 628[4] wildcat wells drilled 28 discovered pools and 47 discovered extensions to pools (Tables I and II). In addition 25 wells, most of which can not be designated properly as exploratory wells, discovered additional producing zones in known producing areas (Table III).

[1] Manuscript received, April 16, 1949.

[2] Illinois State Geological Survey, Urbana, Illinois.

[3] Department of Geology, Indiana University, Bloomington, Indiana.

[4] This figure does not include wells which tested additional producing zones in producing areas classified by Lahee as deeper-pool tests and shallower-pool tests.

Table I. Discovery Wells of New Fields

(See Fig. 1 for locations of pools)

	Pool	County	Company and Farm	Location	Total Depth Feet	Producing Formation	Depth to Top Feet	Initial Production (Barrels)[a]	Date of Completion	No. of Wells Producing in Pool, Dec. 31, 1948
1	Akin West.............	Franklin	Taylor & Schumaker, U. S. Coal & Coke 1	21-6S-4E	3146	Lower Ohara;Rosiclare	3052;3082	80;160	10-26	1
2	Assumption............	Christian	Nat'l. Assoc. Pet., Simcox 1	29-13N-1E	3070;PB2360	Devonian	2327	31;12	10-12	1
3	Assumption North......	Christian	Nat'l. Assoc. Pet., J. H. Lawrence 1	9-13N-1E	2310	Devonian	2282	116	12-21	4
4	Clay City North.......	Clay	Calvert & Willis & Ashland, Bemis 1	8-3N-8E	3094	Rosiclare;McClosky	3005;3036	365	2-3	15
5	Craig.................	Perry	Nat'l. Assoc. Pet., J. A. Ernest 1	23-4S-4W	3735	Trenton	3623	22	12-14	1
6	Divide South..........	Jefferson	W. R. McKain, Cooke 1	12-2S-3E	2875	McClosky	2871	354	3-9	4
7	Evers.................	Effingham	Central Pipe Line, J. Mette 1	33-8N-7E	2808;PB2676	McClosky	2659	57;63	1-13	1
8	Evers South...........	Effingham	Dunbar, J. Repking 1	8-7N-7E	2690	Rosiclare	2652	30;4	6-8	1
9	Goldengate West.......	Wayne	Cities Service, Bryant 1	5-2S-9E	3480;PB3254	Aux Vases	3226	58	3-9	1
10	Herald North..........	White	Nat'l. Assoc. Pet., Garrison 1	24-6S-9E	2908	Aux Vases	2900	56;30	7-13	4
11	Lancaster North.......	Lawrence	J. S. Young, Jr., Frick & Limp 1	24-2N-13W	2534;PB2316	Bethel	2292	5	5-18	1
12	Livingston............	Madison	J. L. Neary, C. Henke 1	17-6N-6W	536	Pennsylvanian	528	146	7-6	5
13	Maud Central..........	Wabash	C. E. Skiles, H. Groff 1	22-1S-13W	2622	Bethel	2607	104	8-10	*
14	Maud West.............	Wabash	O. D. Sharp, G. Wells 1	20-1S-13W	2570	Cypress	2428	17;3	8-17	*
15	Mayberry North........	Wayne	George & Wrather, M. Monroe 1	27-2S-6E	3440	McClosky	3333	75;10	2-10	0
16	Mills Prairie.........	Edwards	O. Weston, Hasewinkle 1	22-1N-14W	2977	Lower Ohara	2924	33	6-22	1
17	Parkersburg South.....	Edwards	Bridger Basin, W. Schmidt 1	8-1N-14W	3085	Bethel	2813	36;7	8-3	1
18	Passport South........	Richland	Arvin Drlg., A. McDade 1	17-4N-9E	2682	Cypress	2667	23	5-18	2
19	Riffle................	Clay	Black & Central Pipe Line, Hammer 1	5-4N-6E	2763	Rosiclare	2736	200	12-7	1
20	Rochester.............	Wabash	Lynch Oil, Yarbor 1	14-2S-13W	1957	Waltersburg	1876	600	9-21	31
21	Sailor Springs Central	Clay	New Penn Devel., C. O. Schnautz 1	31-4N-8E	3109	Rosiclare	3013	2;20	8-3	1
22	Sailor Springs North..	Clay	Rudy & Witt, LaRue 1	16-4N-8E	2991	Rosiclare	2986	66;1	6-8	1
23	Sailor Springs West...	Clay	Diamond Oil Exploration, Toliver-Woods Comm. 1	15-4N-7E	2620	Cypress	2602	56	5-4	15
24	Shawneetown North.....	Gallatin	Johnson Drlg., G. E. Mathis 1	17-9S-10E	3091	McClosky	3047	68;50	10-5	1
25	Stringtown East.......	Richland	Calvert & Willis & Aurora, H. Schneider 1	4-4N-14W	3017	McClosky	3010	64;3	11-9	1
26	Sumpter South.........	White	W. O. Allen, Hughes 1	2-5S-9E	2611	Waltersburg	2571	25	5-4	1
27	Williams..............	Jefferson	H. E. Howard, A. R. McLaughlin 1	2-3S-2E	2796;PB2585	Aux Vases	2566	12;68	1-4-49	1
28	Zenith................	Wayne	Gulf, W. S. Rush 1	35-2N-5E	2983	McClosky	2970	92	12-21	1

a/ Oil and Water

* Consolidated with Maud North, December 1948

Table II. Discovery Wells of Extensions to Pools

Pool	County	Company and Farm	Location	Total Depth Feet	Producing Formation	Depth to Top, Feet	Initial Production (Barrels)[a]	Date of Completion
1 Amity	Richland	Black, Kocher 1	2-4N-14W	2946	McClosky	2931	37	10-5
2 Barnhill	Wayne	Central Pipe Line et al, Bose 1	28-2S-8E	3463	McClosky	3455	99;12	8-10
3 Bennington	Wayne	Arvin Drlg., Hubble 1	13-1N-9E	3151	Aux Vases	3138	100	12-14
4 Bible Grove Cons.	Clay	Sohio, Stortzum et al 1	6-5N-7E	2511	Cypress	2491	161;130	10-5
5 Bible Grove Cons.	Clay	Baldwin & Pruett, Marshall 1	27-5N-7E	2832	Aux Vases	2801	25;55	8-3
6 Bone Gap South	Edwards	Calvert & Willis, Mayne 1	18-1S-14W	3223				
				PB3110	McClosky	3104	2;14	6-15
7 Bungay Cons.	Hamilton	Nolan, Reed-Twist 1	4-4S-7E	3507	Rosiclare	3396	18;24	11-9
8 Ciene North	Wayne	Nat'l. Assoc. Pet., Feller 1	16-1N-7E	3250				
				PB3075	Aux Vases	3047	42;4	7-13
9 Clay City-Noble					Aux Vases	2903		
Cons.	Clay	Johnson et al, Blessing 1	22-3N-8E	3037	Rosiclare	2985	9;24	5-25
10 Clay City-Noble Cons.	Richland	Arvin Drlg. et al, Hassler 1	2-3N-8E	3140	McClosky	3041	5;30	7-13
11 Dahlgren	Hamilton	Bartmes, Whipple 1	23-3S-5E	3382	McClosky	3292	144	12-14
12 Divide East	Jefferson	Bell Bros., Warren Heirs 1	18-1S-4E	2808	McClosky	2746	51;2	4-13
13 Divide East	Jefferson	Shulman Bros., Halloway 1	21-1S-4E	2797	McClosky	2759	100;20	8-17
14 Dundas East	Richland	Bell Estate et al, Phillips 1	26-5N-10E	3007	Lower Ohara	2909	132	10-12
15 Dundas East	Jasper	Sohio, Robins 1	14-5N-10E	2938	McClosky	2921	134	7-27
16 Ellery North	Edwards	Lambert et al, Broster 1	7-2S-10E	3391	Rosiclare	3321	12;Trace	5-4
17 Fairfield	Wayne	Robinson & Puckett, Wood 1	16-2S-8E	3202	Aux Vases	3182	225;5	4-20
18 Fairfield	Wayne	Nation, Bothwell 1	19-2S-8E	3256	Aux Vases	3229	90	7-13
19 Goldengate Cons.	White	Magnolia, Taylor 1	31-3S-9E	3550	McClosky	3475	9	11-2
20 Half Moon	Wayne	Collins Bros., Messman 1	33-1S-9E	3405	McClosky	3310	146	10-5
21 Herald East	Gallatin	Calvert & Willis & Ashland, Egli 1	30-7S-10E	2184	Tar Springs	2162	50	10-26
22 Inman East	Gallatin	Vandenbark, Big Barn 1	10-8S-10E	2420	Cypress	2404	108	2-10
23 Inman East	Gallatin	Miller Drlg., Johnson 1	22-8S-10E	1998	Waltersburg	1986	53;42	11-16
24 Johnsonville West	Wayne	Robinson & Puckett, Smith 1	36-1N-5E	3114	McClosky	3105	25;60	1-13
25 King	Jefferson	Slagter, Modert et al 1	22-3S-3E	2870				
				PB2772	Aux Vases	2764	35;15	8-24
26 Maud	Wabash	Continental, Schrodt 1	26-1S-13W	2691	Rosiclare	2680	11;21	10-19
27 Maud North	Wabash	Ross, Ankenbrandt 1	5-1S-13W	2549	Bethel	2539	30	7-13
28 Maud North	Wabash	Mortimer, Peters 1	19-1S-13W	2526	Cypress	2520	15;5	7-13
29 Maud North	Wabash	Skiles, Smith 1	20-1S-13W	2589	Bethel	2576	140;3	5-25
30 Maud North	Wabash	Phillips & Duncan, Keeps & Pfeister 1	24-1S-14W	2996				
				PB2565	Cypress	2558	12;2	8-3
31 Mill Shoals	Wayne	Phillips, Book 1	31-2S-8E	3389	McClosky	3375	189;72	1-6
32 Mt. Carmel West	Wabash	Gilliam Drlg., Seitz 1	23-1S-13W	2288	Cypress	2280	219	2-3
33 Passport	Clay	Bander et al, Phillips 1	14-4N-8E	3041	McClosky	3010	240	5-25
34 Roland	Gallatin	Brehm et al, Burns 1	20-7S-8E	2188	Waltersburg	2180	360	8-3
35 Rural Hill	Hamilton	Gulf, Lightner 1	3-7S-5E	3529	Aux Vases	3306	170;40	6-1
36 Sailor Springs Cons.	Clay	Magnolia, Drake 1	23-4N-7E	2630	Cypress	2591	94;22	9-7
37 Sailor Springs West	Clay	Diamond Oil & Exploration, Dillman 1	15-4N-7E	2996	Ste. Genevieve	2924	18;16	6-29
38 Sesser	Franklin	Mosebach, Burgil 1	35-5S-1E	2768				
				PB2638	Aux Vases	2586	50	7-13
39 Stanford South	Clay	Wright, McLaughlin 1	17-2N-7E	3116	McClosky	3104	25;37	2-24
40 Stringtown	Richland	Fulk et al, Jenkins 1	30-5N-11E	3028	McClosky	3016	1051	10-26
41 Stringtown	Richland	Johnson et al, Von Almen Heirs 1	31-5N-14W	3010	McClosky	2997	1724	9-7
42 Sumpter	White	Duncan & Duncan, Barbare-Robstock 1	25-4S-9E	3280				
				PB2880	Cypress	2862	15;15	9-21
43 Thompsonville North	Franklin	Sheppard, Sweet 1	9-7S-4E	3075	Aux Vases	3066	110	7-6
44 Thompsonville North	Franklin	Proderman-Connelly, Carter 1	15-7S-4E	3146	Aux Vases	3136	60;Trace	4-13
45 Thompsonville North	Franklin	Ford, Wood Trustee 1	16-7S-4E	2759	Cypress	2750	30;30	11-2
46 Toliver East	Clay	Redwine, McGee 1	24-5N-6E	2827	Rosiclare	2817	42;60	2-10
47 Whittington	Franklin	George & Wrather & Aurora, Wilcox 1	20-5S-3E	2318	Hardinsburg	2308	92	10-19

a Oil and Water

Table III Discovery Wells of Additional Producing Zones in Pools

Pool	County	Company and Farm	Location	Total Depth Feet	Producing Formation	Depth to Top. Feet	Production (Barrels)[a]	Date of Completion of Discovery Well
Aden Consol.	Wayne	Weinert, Morlan "A"-2	33-2S-7E	3756	Salem	3737	22;7	2-3
Belle Prairie	Hamilton	Phillips, Young 1	12-4S-8E	3425	Aux Vases[b]	3251	44;2	7-27
Bone Gap South	Edwards	Phillips, Bone 1	19-1S-14W	3165	Lower Ohara	3058	45;33	1-6
Clay City North	Clay	Calvert & Willis & Ashland, Bomis "B"-6	8-3N-8E	2658	Cypress	2649	90;35	8-31
Crossville	White	Engle, Ridenour 2	10-4S-10E	3136 PB 2892	Bethel	2881	40;Trace	7-6
Divide East	Jefferson	Nat'l. Assoc. Pet.,McElravy 3	17-1S-4E	2732	Rosiclare	2729	175	4-20
Divide East	Jefferson	Bell, Sledge 1	20-1S-4E	2810	McClosky	2723	113;8	3-23
Grayville West	White	Mitchell (Thorne),Hatcher 1	22-3S-10E	3305 PB 1966	Biehl	1957	42;140	5-4
Inman West	Gallatin	Kingwood, Fillingham 1	22-8S-9E	2984	Lower Ohara[b]	2828	3;25	4-13
Iola South	Clay	Robinson & Puckett, Franklin 1	11-4N-5E	2675 PB 2437	Bethel	2422	25;24	3-9
Maud	Wabash	Skiles, Alka 2	34-1S-13W	2678	Lower Ohara	2608	70	4-20
Maud	Wabash	Skiles, Schrodt 2-A	3-2S-13W	2355	Biehl[b]	1718	100	7-27
Maud North	Wabash	Mortimer, Peters 1	19-1S-13W	2526	Cypress	2520	15;5	7-13
Mt. Carmel West	Wabash	Brubeck & Pappas - George & Wrather, Chapman 1	14-1S-13W	2589	Lower Ohara	2542	115	6-8
Mt. Carmel West	Wabash	Gilliam, Seitz 1	23-1S-13W	2288	Cypress	2280	219	2-3
New Harmony-Keensburg Consol.	Wabash	Sourapas, Hocking 4	20-2S-13W	2604 PB 1348	Bridgeport	1339	10	12-7
Omaha	Gallatin	Carter, York 2	33-7S-8E	1353	Biehl	1320	139;20	6-22
Passport South	Richland	Arvin Drlg., Stone 1	18-4N-9E	3033	Rosiclare	3027	54	8-17
Rochester	Wabash	Lynch & Alberding, Legier 1	14-2S-13W	1968 PB 1298	Pennsylvanian	1271	75	10-12
Sailor Springs West	Clay	Diamond Oil Exploration,Dillman1	15-4N-7E	2996	Ste. Genevieve	2924	18;16	6-29
Shattuc	Clinton	Talbot, Cullick 1-T	28-2N-1W	4071	"Trenton"	4000	50;40	11-9
Thompsonville North	Franklin	Ford, Wood Trustee 1	16-7S-4E	2759	Cypress	2750	30;30	11-2
Whittington	Franklin	Geo. & Wrather & Aurora,Wilcox1	20-5S-3E	2318	Hardinsburg[b]	2308	92	10-19
Whittington West	Franklin	Jones, Johnson 1	14-5S-2E	2804	Lower Ohara[b]	2800	157	1-6
Woodlawn	Jefferson	Magnolia, Eubank 2	35-2S-1E	2200	McClosky	2197	18;1½	1-6

a Oil & Water
b Dual Producer

TABLE IV Selected List of Dry Tests

Pool	County	Company and Farm	Location	Total Depth Feet	Deepest Formation	Depth to Top. Feet	Date of Completion
1	Bond	Sun, Bauer 1	20-5N-2W	3561	"Trenton"	3384	8-31
2	Champaign	Hays, Richmond 1	23-21N-7E	1170	"Trenton"	1096	1-4-49
3	Christian	Nat'l Assoc. Pet. and Cont., Peabody Coal "B" 1	33-13N-3W	2606	"Trenton"	2510	12-28
4 Assumption*	Christian	Nat'l Assoc. Pet, Simcox 1	29-13N-1E	3070	"Trenton"	2915	10-12
5	Clark	Schaffer & Granholm, Robinson 1	17-11N-10W	2130	Devonian	2094	1-4-49
6 Kenner West	Clay	Phillips, Randall 5	23-3N-5E		Devonian		6-15
7	Clinton	Dirickson, Kleystuber 1	34-3N-1W	2862	Devonian	2790	9-21
8	Coles	Walker, Temples 1	31-14N-11E	2355	"Trenton"	2014	9-7
9	Douglas	Landon, Bareither 1	24-15N-8E	564	Devonian	289	3-2
10	Edgar	Wright, Fenwick 1	36-15N-14W	820	Devonian	751	8-17
11	Hancock	Lambert, Boeddeker 1	23-7N-8W	1002	St. Peter	972	4-27
12	Jackson	Lambert, Hasler 1	28-10S-2W	2565	Devonian	2117	12-21
13 Colmar-Plymouth	McDonough	Lambert, Mathews 1	20-4N-4W	895	St. Peter	885	12-14
14 Colmar-Plymouth	McDonough	Lambert, McCutchen 1	28-4N-4W	435	Maquoketa	431	9-28
15	Macon	Breeze and Bayless, Hiser 1	27-17N-3E	2308	Silurian	2262	11-23
16	Madison	Kerwin, Mann 1	16-3N-8W	2032	"Trenton"	1834	7-13
17	Marion	Booth, Green 1	13-4N-2E	3633	Devonian	3561	2-24
18	Montgomery	Pentecost, Pope 1	28-9N-3W	2882	"Trenton"	2801	6-22
19	Montgomery	Nat'l Assoc. Pet, Borgic 1	36-10N-4W	2806	"Trenton"	2678	11-9
20 Pike County Gas	Pike	Pan Handle Eastern, Mumford 21-1	21-5S-4W	2226	Pre-Cambrian	2221	2-24
21	Pulaski	White, Goza 1	20-15S-1E	1150			10-5
22	Union	Ohio, Cross 1	21-13S-2W	1500	St. Peter	1445	11-30
23 McKinley**	Washington	McBride, Hunleth 1	29-3S-4W	3983	"Trenton"	3013	7-27

* Plugged back to Devonian production.
** Plugged back to Silurian production.

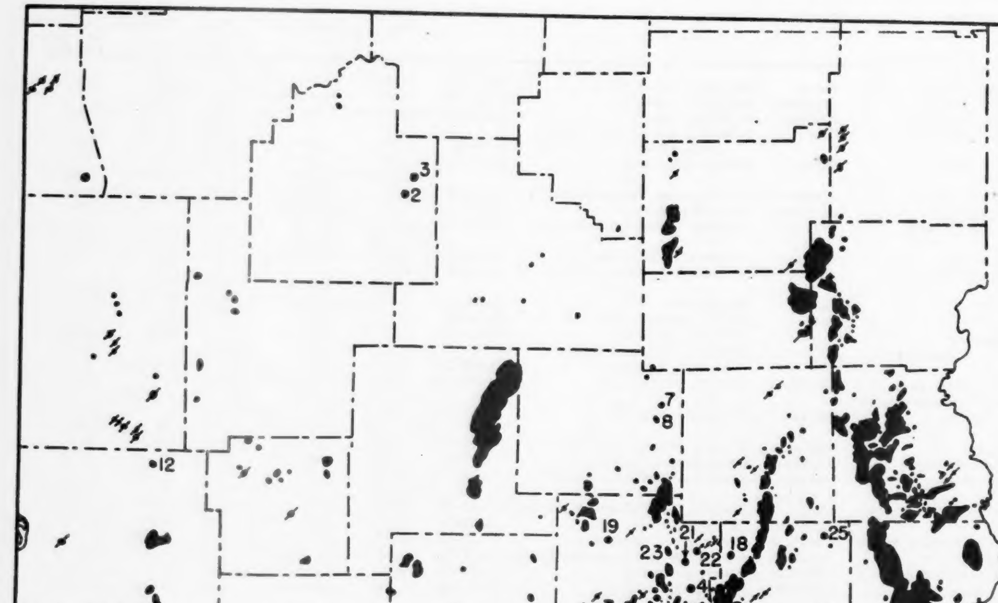


FIG. 1.—New pools discovered in Illinois in 1948. All present and former oil- and gas-producing areas are shown in black. See Table I for pool number identification.

The geographic pattern of drilling mainly followed that prevalent in recent years, the greatest number of completions by counties being in Wayne (342), followed by Wabash (312), Clay (310), Gallatin (217), and White (182). Wells in Clay County averaged 200 barrels initial production, almost double the state average of 112 barrels.

The pools with the greatest number of successful oil-well completions in 1948 were as follows: Clay City-Noble Consolidated, 229; Inman East, 93; Thompsonville North, 51; Maud North Consolidated, 47; Sailor Springs Consolidated, 45; Passport, 40.

Total oil production in Illinois in 1948 was 64,669,000 barrels as compared with 66,459,000 barrels in 1947, a decrease of 3 per cent. Average daily production in 1948 was 177,000 barrels. Average daily production by months during the year ranged between a low of 170,000 barrels in April and a high of 182,000 barrels in October.

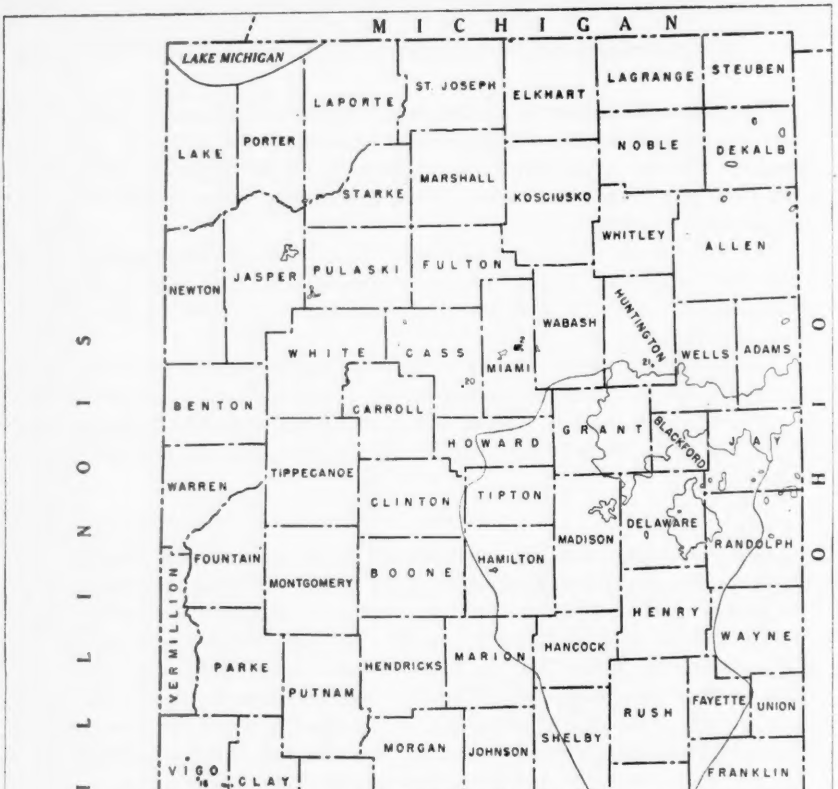
EXPLORATORY DRILLING

As shown on the map (Fig. 1) nearly all of the new oil pools discovered in 1948 were close to previous production. A noteworthy exception was the Assumption pool in Christian County, 19 miles northwest of the Lakewood pool in Shelby County and 14 miles southeast of the Mt. Auburn pool in Christian County, both of which are small. The Assumption North pool discovery well is about 3 miles north of Assumption pool. The Devonian limestone is productive in both of these pools at an approximate depth of 2,280 feet, and this discovery extends northward the region in which Devonian limestone is productive in Illinois.

Two shallower zones are productive in the North Assumption pool, the Bethel sandstone in the Chester series, approximate depth 1,040 feet, and the Rosiclare sandstone in the Ste. Genevieve formation of the Lower Mississippian. The Rosiclare sand was found to be unexpectedly thick and prolific for a location this far north in the basin. Several of the Rosiclare wells in Assumption North had initial productions of about 400 barrels at depths of about 1,170 feet. Good oil production is also obtained from the Rosiclare in the Mattoon pool 39 miles east. Prospects thus appear good for further Rosiclare sandstone production in an area of several counties in the northern part of the Illinois basin.

A list of some of the most noteworthy dry holes completed in 1948 is given in Table IV. Little deep testing was done. The "Trenton" was tested without success in the McKinley (No. 23) and Assumption (No. 4) pools. The only St. Peter sandstone tests were in western Illinois (Nos. 11 and 13) and extreme southern Illinois (No. 22). The only test to reach the pre-Cambrian (No. 20), located on the Pittsfield-Hadley anticline in Pike County, was drilled in 1947 but not officially completed until 1948.[5]

[5] Alfred H. Bell and Ralph E. Esarey, "Developments in Illinois and Indiana in 1947," *Bull. Amer. Assoc. Petrol. Geol.*, Vol. 32, No. 6 (June, 1948), pp. 925–27.



MAP SHOWING OIL AND GAS FIELDS IN INDIANA

FIG. 2.—New fields discovered in Indiana in 1948 (in black). See Table VII for pool number identification.

METHODS OF EXPLORATION

The principal methods used in locating exploratory wells continued to be subsurface geology and the reflection seismograph (Table V.)

TABLE V

WILDCAT WELLS MORE THAN 2 MILES FROM PRODUCTION CLASSIFIED BY METHOD OF LOCATION

Method of Location	*Total*	*Producers*
Geology	179	24
Geophysics	3	2
Geology and geophysics	14	2
Total scientific	196	28
Non-scientific	32	0
Unknown	3	0
Grand total	231	28

TABLE VI

NUMBER OF GEOPHYSICAL CREWS ACTIVE IN ILLINOIS DURING 1948 BY MONTHS

Months	*Seismograph*	*Gravity Meter*	*Resistivity*
January	6	1	1
February	6	1	1
March	6	1	
April	6	1	
May	6	1	
June	4	1	
July	5	1	
August	6	1	
September	6	1	
October	5		
November	5		
December	3		
Totals	64	9	2

Of the wildcat wells more than 2 miles from production, the 196 located by scientific methods were 14 per cent successful, whereas there were no successes among those not located by scientific methods. The amount of seismograph work in Illinois decreased 25 per cent from 86 crew-months in 1947 to 64 crew-months in 1948 (Table VI)

INDIANA

By R. E. Esarey and B. E. Brooks

Production in Indiana during 1948 increased 21 per cent over 1947, and reached 7,811,521 barrels, the highest since the peak of Trenton production in 1905. The new discoveries of all types totaled 61 of 1,173 wells drilled during the year. The new fields are shown on the accompanying map in black and are numbered according to the table of new-field discoveries (Table VII). The older producing areas are shown in outline.

The most significant development in Indiana was the opening of three new Devonian fields in Sullivan and Vigo counties. Two of the fields, Wilfred and Marts in Sullivan County, were discovered on the basis of surface structure determined from coal drilling, and the Spring Hill field in Vigo County was located by non-technical means. Oil in these fields is produced from three zones in the Devonian limestones and dolomites at depths between 1,800 and 2,300 feet.

The discovery wells for these fields are included in Table VII. Potentials of some wells were estimated above 1,000 barrels daily. The Salem limestone, of Middle Mississippian age, is being watched carefully as a possible good producing zone. Several wells were completed in the Salem in the Prairie Creek field. The old Riley and Siosi fields are being revived by new producing wells within the limits of the old production. Similarly, a Carter oil completion in the 10-year old Prairie Creek field reported 768 barrels per day from the Devonian. Intensive leasing, exploration, and drilling have resulted from the discoveries which create the prospect of many additional tests to the Devonian, Silurian, and Trenton in this part of the basin.

In the "Pocket" area of Indiana (which includes Posey, Vanderburgh, and Gibson counties) 14 new fields and 29 extensions and new producing zones were discovered. The most important discovery in this area is the Rochester field in Gibson County. This field is a stratigraphic trap which produces from the Waltersburg sand of Upper Mississippian age. It was opened in June, 1948, and by December 31 had an accumulated production of more than 549,700 barrels. Many wells in the field produced more than 1,000 barrels per day and the daily average production during November was 3,177 barrels for the field. In Gibson County 6 new fields, 4 extensions, and 4 additional producing zones were discovered, all of which produce from Mississippian formations. The opening of two more Waltersburg fields caused intensive sand studies being carried out in this part of the basin in an effort to find additional stratigraphic accumulations.

In Posey County, 134 producing wells were completed of a total of 240 drilled. Five new fields, 6 new pools, and 4 extensions were opened throughout the county. Most of the producing beds are Chester and Middle Mississippian, but some good Pennsylvanian saturation was found. The discovery well of the Spencer field made 1,137 barrels from the McClosky zone of the Ste. Genevieve.

Daily production in Vanderburgh County was quadrupled by the discovery of 4 new fields, 7 new pools, and 4 extensions. Shallow Pennsylvanian oil was

TABLE VII Discovery Wells of New Fields in Indiana in 1948

	Pool	County	Company and Farm	Location	Total Depth	Producing Formation	Production
1	Darmstadt	Vanderburgh	Gilliam Drlg. Co., Spilker #1	12-5S-11W	2597	Ste. Gen.	198 bbls.
2	East Peru	Miami	A. J. Palmer, Harrison #1	19-27N-5E	905	Trenton	80 bbls.
3	Ford	Posey	Heath & Ind. Farm Bur., Fischer #1	22-6S-12W	2259	Cypress	32 bbls.
4	Ford North	Posey	G. L. Reasor, Justus #1	15-6S-12W	2256	Cypress	104 bbls.
5	Harrison Gas	Harrison	New Boston Oil & Gas Corp., Fox #2	6-6S-5E	282	New Albany	400 MCF
6	Loogootee North	Martin	Barrow, Crane #1	4-3N-4W	1690	New Albany	280 MCF
7	Marts	Sullivan	A. S. Reed, Bolinger #1	19-9N-9W	2229	Devonian	50 bbls.
8	McGary	Gibson	Geo. S. Engle, Teel #1	16-3S-11W	1702	Waltersburg	112 bbls.
9	Mounts	Gibson	C. E. Skiles, Smith #1	13-3S-12W	2635	Waltersburg	20 bbls.
10	Mt. Vernon E.	Posey	Ind. Farm Bureau, Hohstradt #1	33-6S-13W	2982	Ste. Gen.	87 bbls.
11	Owensville E.	Gibson	Superior, Tucker #1	4-3S-11W	2525	Benoist	4 bbls.
12	Parker	Posey	S. D. Jarvis, Schweikart #1	1-6S-12W	2100	Tar Springs	10 bbls.
13	Rochester	Gibson	Sharp, Berry #1	13-2S-13W	1953	Waltersburg	600 bbls.
14	Rosewood Gas	Harrison	Albertson, McCauley #1	3-6S-5E	250	Devonian	80 MCF
15	Spencer	Posey	Schock & Gallagher & Aurora, Spencer #1	12-8S-14W	2975	Ste. Gen.	1134 bbls.
16	Spring Hill	Vigo	C. B. Mansfield, Sutliff #1	14-11N-9W	1803	Devonian	200 bbls.
17	St. James	Gibson	Zink, Maier #1	12-4S-11W	2392	Ste. Gen.	20 bbls.
18	Vienna North	Vanderburgh	George & Wrather, Heneisen #1	19-5S-11W	2775	Aux Vases	150 bbls.
19	Vienna South	Vanderburgh	Aurora, Boeke #1	6-6S-11W	2655	Aux Vases	57 bbls.
20	Walten Townsite	Cass	T. W. Drake, Shaffer #1	36-26N-2E	1008	Trenton	13 bbls.
21	Warren	Huntington	S. Vegars, Jones #1	17-26N-10E	1006	Trenton	30 bbls.
22	Warrentown	Gibson	George & Wrather, Zilliak #1	18-4S-10W	2351	Ste. Gen.	88 bbls.
23	Wilfred	Sullivan	F. B. Cline, Siepman #1	30-9N-8W	2039	Devonian	60 bbls.

TABLE VIII Discovery Wells of Extensions to Fields in Indiana in 1948

Pool	County	Company & Farm	Location	Total Depth	Producing Formation	Production
Bufkin	Posey	Cherry & Kidd & Ashland, Pappenmeier #1	4-6S-12W	2407	Cypress	75 bbls.
Caborn	Posey	Hollingsworth & Travis, Egli #4	19-6S-12W	1760	Biehl sd.	15 bbls.
Columbia	Gibson	Lensgraf, Mason #1	8-2S-8W	1253	Jackson	32 bbls.
Evansville	Vanderburgh	Tedrow, Seibert et al #1	10-6S-11W	1019	Penn.	75 bbls.
Martin	Vanderburgh	Duncan, Allen Comm. #1	6-5S-11W	2292	Cypress	130 bbls.
Martin	Vanderburgh	George & Wrather, Reimann #1	30-4S-11W	2218	Cypress	276 bbls.
Mt. Carmel Cons.	Gibson	Ill. Mid. Cont., Pugh-Grant #1	36-1S-12W	2053	Cypress	47 bbls.
Mt. Carmel Cons.	Gibson	Geo. Engle, Baltzell #1	31-1S-11W	2304	Ste. Gen.	2 bbls.
Mt. Carmel E.	Knox	S.D. Jarvis, Holsen - Stillwell #1	13-1S-12W	2089	Benoist	104 bbls.
Oliver	Posey	C. E. Mickens, Becker #1	1-6S-13W	698	Penn.	2500 MCF
Oliver	Posey	C. E. Mickens, Becker #1	2-6S-13W	835	Penn.	332 MCF
Owensville N.	Gibson	Superior, Brady #1	13-2S-12W	2332	Ste. Gen.	6 bbls.
Owensville N.	Gibson	Gilliam Drlg. Co., Montgomery #1	18-3S-11W	2475	Ste. Gen.	11 bbls.
Union-Bowman	Pike	S.D. Jarvis, Gladish #1	24-1N-9W	1323	Jackson	14 bbls.
Union-Bowman	Pike	J. T. Peak, Dillin #1	15-1N-9W	977	Penn.	8 bbls.
Vernon Heights	Vanderburgh	Aurora & Engle, Pride-Jones Comm. #1	8-7S-11W	2598	Ste. Gen.	130 bbls.

TABLE IX Discovery Wells of Additional Producing Zones in Indiana in 1948

Pool	County	Company & Farm	Location	Total Depth	Producing Formation	Production
Belknap	Vanderburgh	Geo. S. Engle, Jourdan et al #1 comm.	18-6S-11W	1617	Biehl	150 bbls.
Belknap	Vanderburgh	Geo. S. Engle, Koressel #1	17-6S-11W	1916	Tar Springs	8 bbls.
Bufkin	Posey	Cherry, Kidd, & Ashland, Boberg #1	4-6S-12W	2672	Aux Vases	115 bbls.
Cypress	Vanderburgh	Joe Reznik, Edmond et al #1	10-7S-11W	2439	Ste. Gen.	75 bbls.
Evansville	Vanderburgh	Maynard Rogers, Ross #1	36-5S-11W	2374	Ste. Gen.	40 bbls.
Ford North	Posey	Cherry & Kidd, Esche #2	10-6S-12W	2651	Ste. Gen.	150 bbls.
Francisco W.	Gibson	C. M. Amsler, Witherspoon #1	26-2S-10W	1931	Ste. Gen.	24 bbls.
French	Spencer	R. Hal Compton, Montgomery-Elbe #1	19-7S-7W	1708	Ste. Gen.	35 bbls.
Hovey West	Posey	Coy Oil Co., P. A. Lynch #1	26-7S-15W	2481	Cypress	42 bbls.
McGary	Gibson	Flamingo Oil Co., Teel #3	16-3S-11W	2278	Benoist	25 bbls.
McGary	Gibson	Ill. Mid. Cont., Douglas Heirs #1	17-3S-11W	2176	Cypress	20 bbls.
Mt. Carmel Cons.	Gibson	Ill. Mid. Cont., McFarland #1	19-1S-11W	2356	Ste. Gen.	150 bbls.
New Harmony Cons.	Posey	George & Wrather, Westheiderman #1	2-4S-14W	2887	Aux Vases	150 bbls.
Parker	Posey	A. J. Slagter, Herrenbruck hrs. #1	2-6S-12W	2640	Ste. Gen.	45 bbls.
Parker	Posey	A. J. Slagter, Felthouse #1	35-5S-12W	2688	Ste. Gen.	90 bbls.
Prairie Creek	Vigo	H. Luttrell, Strain et al #2	16-10N-10W	1267	Salem	4 bbls.
Rockport	Spencer	Garwood et al, Abshire et al #1	17-7S-6W	1438	Aux Vases	3 bbls.
Springfield Cons.	Posey	Cherry & Kidd, Truscott #1	31-5S-13W	1200	Penn. sd.	18 bbls.
Vernon Heights	Vanderburgh	Johnston Drlg. Co., Keck #1	6-7S-11W	2472	Aux Vases	250 bbls.
Vernon Heights	Vanderburgh	Johnston Drlg. Co., Nurrenbern #7-A	6-7S-11W	2194	Jackson	30 bbls.
Vienna	Vanderburgh	W. O. Morgan, Boeke #1	6-6S-11W	2609	L. O'Hara	160 bbls.
West Franklin	Posey	B. M. Heath, Welborne #1-A	13-7S-12W	1811	Waltersburg	30 bbls.

found in the Belknap and Evansville pools, but most of the new oil came from the Mississippian. The discovery well of the Martin extension made 276 barrels in the Cypress and the Vernon Heights discovery well made 250 barrels in the Aux Vases sand. One hundred new producing wells were completed in the county.

Within the old fields of Pike County, 53 new producing wells were drilled. They consist of extensions and undrilled locations in the old fields, and practically all of the oil comes from Mississippian rocks. A Silurian test reaching the total depth of 2,702 feet was drilled in Daviess County on the Swan lease by the Hagar Oil Company in Sec. 28, T. 2 N., R. 7 W. The Devonian was tested but failed to make a commercial well. The Brown well in Sec. 34, T. 2 N., R. 6 W., reported good showings in both the Salem and Devonian formations but failed to make a producer. In Martin County, a gas well reported as flowing 3,000 MCF daily, was drilled in Sec. 4, T. 3 N., R. 4 W. The gas is coming from the New Albany shale of Devonian age. Interest in Spencer County was revived somewhat by the opening of two pools, one in the Aux Vases and one in the Ste. Genevieve formation, respectively. Forty-four wells were drilled in the county and 15 were producers.

Devonian tests were drilled in several counties around the rim of the basin, including Clay, Greene, Parke, Fountain, Vermillion, Owen, and Morgan. Considerable interest is being shown in Devonian, Silurian, and Trenton possibilities in this area, and it will undergo widespread exploration and testing during the coming year. Five tests were drilled west of the outcrop of Devonian formations in southeastern Indiana in the attempt to find shallow Devonian or Trenton production. No commercial saturation was found in any of the wells.

Search for additional oil in the Trenton area of central and northern Indiana continues with some success. In Hamilton County, 21 wells were drilled, of which 12 were producers. The wells averaged about 10 barrels each when put on the pump. Six new oil wells and 3 gas wells were drilled in Jay County, of a total of 15 tests. Miami County was the most active by far in the old Trenton area where 81 wells were drilled, of which 54 were producers. The East Peru field was the only major discovery. Wabash County which adjoins Miami on the east, had 8 wells drilled of which 6 were oil wells.

Indiana has experienced one of its best years in history, during which more than 2,000,000 feet of hole were drilled and 584 wells completed as producers. In all, 23 new fields were discovered and 307 wildcat wells drilled. Exploration and leasing are increasing, and 1949 may be a still better year for the oil industry.

BULLETIN OF THE AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS
VOL. 33, NO. 6 (JUNE, 1949), PP. 877-882, 1 FIG., 4 TABLES

DEVELOPMENTS IN MICHIGAN IN 1948[1]

MANLEY OSGOOD, JR.[2]
Mount Pleasant, Michigan

ABSTRACT

During 1948 there was an increase in both drilling activity and crude-oil production in Michigan. Of the 310 wildcat wells completed, 22 were successful, resulting in the discovery of 10 new oil fields, 4 new gas fields, and in the extension of 8 oil fields. New producing zones were discovered in 3 fields with 2 new producing zones occurring in one of these. The Pentwater field in Oceana County appears to be the most important discovery of the year, both from the standpoint of reserves and geological significance. At year's end, 44 Dundee and 8 Traverse wells in this field were producing approximately 3,500 barrels per day. The new gas fields discovered are not of significant size.

Permits issued during 1948 were 918, an increase of 32 over the previous year. Total footage drilled was 2,120,000 feet, a 6½ per cent increase over 1947. Wildcat footage, at 691,420 feet was up 11 per cent.

Oil production for 1948 was 16,871,046 barrels, an increase of 4 per cent over 1947, and marked the end of a 5-year decline. Gas production of 21,369,587,000 cubic feet was down 10 per cent, the first annual decrease in the history of Michigan gas production.

Core-drilling activity was far ahead of previous years, with 444 geological test permits issued; 304 of these were in the West Michigan district. Very little geophysical work was done.

The deepest test ever drilled in Michigan was completed in February, 1948, at the total depth of 11,012 feet in the Cambro-Ordovician. It was drilled in the West Branch field, Ogemaw County, by the Ohio Oil Company and the Pure Oil Company. No substantial showings of oil or gas were encountered.

INTRODUCTION

Activity in Michigan oil and gas operations increased during 1948. There were 918 drilling permits issued, an increase of 32 over 1947. Well completions totaled 917, an increase of 21 over 1947. Total footage drilled was 2,120,000 feet, a 6½ per cent increase over the previous year. Wildcat footage was 691,420 feet, an 11 per cent increase over 1947. Average depth of wildcats drilled was 2,230 feet, which is somewhat less than the 1947 average depth, and reflects the increased activity in the shallower areas of western and southwestern Michigan. Table I shows total Michigan operations and production broken down into districts.

Of the 310 exploratory wells drilled, 26 were successful, resulting in a success percentage of 8.4. Ten new oil fields and 4 new gas fields were discovered, and 8 oil fields were extended. New producing zones were found in 3 fields, with 2 new producing zones occurring in one of these.

Oil production for 1948 was 16,871,046 barrels, an increase of 4 per cent over 1947 and the first increase in annual production in 6 years.

Gas production declined 10 per cent to 21,369,587,000 cubic feet, the first annual decrease in the history of Michigan gas production.

Gas well completions totaled 109 as compared with 191 in 1948. Of the 109 gas wells completed, 77 were facility wells drilled in storage reservoirs for withdrawal and in-put purposes.

[1] Manuscript received, April 1, 1949.

[2] Consulting geologist. The assistance of Rex Grant, K. G. Walsworth, and others in the Michigan Geological Survey in supplying statistical data and other information is acknowledged and appreciated.


EMMET
CHEBOYGAN
PRESQUE ISLE
CHARLEVOIX
ANTRIM
OTSEGO
MONT-MORENCY
ALPENA
LEELANAU
BENZIE
GRAND TRAVERSE
KALKASKA
CRAWFORD
OSCODA
ALCONA
Beaver Creek
MANISTEE
WEXFORD
Jennings
MISSAUKEE
ROSCOMMON
OGEMAW
IOSCO
Clam Union
MASON
LAKE
OSCEOLA
CLARE
GLADWIN
ARENAC
Sterling
Standish
Sylvan
HURON
Eden
Pentwater
Isabella
BAY
OCEANA
NEWAYGO
MECOSTA
ISABELLA
MIDLAND
Holton
TUSCOLA
SANILAC
MUSKEGON
Casnovia
MONTCALM
GRATIOT
Newark
SAGINAW
Rockford
Bloomer
LAPEER
OTTAWA
KENT
IONIA
Lebanon
CLINTON
SHIAWASSEE
GENESEE
ST. CLAIR
Heath
South Hopkins
ALLEGAN
Martin
BARRY
EATON
INGHAM
LIVINGSTON
OAKLAND
MACOMB
Allegan
Geneva
VAN BUREN
KALAMAZOO
CALHOUN
JACKSON
WASHTENAW
WAYNE
BERRIEN
Niles
CASS
ST. JOSEPH
BRANCH
HILLSDALE
LENAWEE
MONROE
DEVELOPMENTS IN MICHIGAN
1948
LEGEND
OIL DISCOVERY
GAS DISCOVERY
FIELD EXTENSION
NEW PRODUCING FORMATION
SCALE IN MILES
0 10 20 30 40 50 60

FIG. 1

TABLE I

MICHIGAN OPERATIONS BY DISTRICTS IN 1948

Districts	Permits Issued	Wells Compltd.	Oil Wells	Initial Potential (Bbls.)	Gas Wells	Initial Potential (1,000 cu.ft.)	Dry Holes	Production Oil (Bbls.)	Production Gas (1,000 cu.ft.)	Geological Test Permits
Basin	401	412	135	18547	93	348,489	184	12,381,314	17,303,881	58
Eastern & Southeastern	19	26			8	13,171	18	21,561	2,433,750	7
Northern	57	45	39	11630			6	370,543	8,604	47
Southwest'n	304	299	121	8619	2	111	176	1,079,088	56,211	28
Western	137	135	75	31722	6	83,939	54	3,018,540	1,567,141	304
Totals	918	917	370	70,518	109 [1]	445,710	438	16,871,046	21,369,587	444

1 77 of these wells were drilled in storage fields for in-put or withdrawal purposes.

TABLE II

1948 DISCOVERIES

COUNTY	FIELD	SECTION TOWNSHIP RANGE	WELL	PERMIT NUMBER	DATE 1948	DEPTH OF PAY (feet)	INITIAL PRODUCTION	PRODUCING FORMATION	METHOD OF LOCATION	NO. OF Prod.Well Jan.1 1949
			NEW FIELDS							
Allegan	Martin	18 2N 11W	Basin Oil - Noteboom 1	14561	12/9	1617	14 acid	Traverse	Subsurf.	1
Allegan	Heath	14 3N 14W	Lang - Boyce Pub. Adm.1	14082	6/22	1522	70 acid	Traverse	Subsurf.	14
Allegan	S.Hopkins	30 3N 12W	Schelling - Barnhardt 1	13869	4/15	1538	350 acid	Traverse	Subsurf.	18
Arenac	Standish	10 18N 4E	F. E. Roush - Angus 1	13859	6/7	4108	30 acid	Richfield	Subsurf	1
Clinton	Lebanon	34 8N 4W	Mercer Oil - Werner 1	14487	11/7	2548	12 oil-12 water	Traverse	Subsurf.	1
Gratiot	Newark	25 10N 4W	Harper-Turner;Rudd et al 1	13862	4/20	979	4,290 M gas	Mich.Stray	Subsurf.	5
Isabella	Isabella	7 15N 4W	Merrill Drlg.-Sheahan 1	14015	10/31	3787	178 pinched	Dundee	S.S.& C.D.	1
Mason	Eden	26 17N 16W	Superior - B.Sippey 1	14066	7/5	1679	30 Bbl./hr.	Traverse	Core Drill	3
Missaukee	Clam Union	2 21N 6W	Gulf - Alderman 1	13791	2/12	1266	193 M gas	Mich.Stray	Subsurf.	1
Missaukee	Jennings	30 23N 8W	Sohio - State-Caldwell 1	14469	12/23	1150	892 M gas	Mich.Stray	Subsurf.	1
Muskegon	Holton	9 12N 15W	Muskegon Dev.- Sch.Dist.1	14263	9/28	1993	30 oil,30 water	Traverse	Subsurf.	1
Muskegon	Casnovia	26 10N 13W	Rex - Todd 1	13826	3/3	1534	139 M gas	Berea	Subsurf.	1
Oceana	Pentwater	6 16N 17W	Roosevelt - McMillen 1	13716	5/12	2088	90 acid	Dundee	Core Drill	44
Osceola	Sylvan	9 18N 7W	Gulf - State-Sylvan 1	14090	7/12	3922	278 acid	Dundee	Subsurf.	4
			FIELD EXTENSIONS							
Allegan	Allegan	27 2N 13W	Anderson - Konecke 1	14335	9/21	1358	11 oil-4 water	Traverse	Subsurf.	
Arenac	Sterling	17 19N 4E	Mutch - Mutch 1	14402	10/16	1954	20 acid	Traverse	Subsurf.	
Berrien	Niles	2 7S 17W	S.Sanitation - Foster 1	13748	1/20	647	125 Bbl.	Traverse	Subsurf.	
Kalkaska	Beaver Creek	12 25N 5W	Sun Oil - Garden 1	13815	3/14	4231	100 acid	Richfield	S.S.& C.D.	
Kent	Rockford	19 9N 10W	McCall - Townsend 1	14413	11/3	2258	2 oil-7 water	Traverse	Subsurf.	
Mason	Pentwater	35 17N 18W	Welsh - Wright 1	14077	8/13	2098	92 - $\frac{1}{2}$ hr.acid	Dundee	Subsurf.	
Montcalm	Bloomer	36 9N 6W	Hood - Hopkins 1	13659	1/12	2630	7 acid	Traverse	Subsurf.	
Van Buren	Geneva	21 1S 16W	Stevens - Tranker 1	13828	3/10	1010	12 oil-100 wtr.	Traverse	Subsurf.	
			NEW PRODUCING FORMATIONS							
Arenac	Sterling	18 19N 4E	Rayburn - Hertzberg 1	14018	6/1	1966	22 acid	Traverse		11
Mason	Eden	26 17N 16W	Superior - Sippy 2	14167	8/28	2353	50 - 9 hrs.acid	Detroit River		3
Mason	Eden	26 17N 16W	Superior - Sippy 3	14337	9/18	2236	108-1 3/4hrs.acid	Dundee		1
Oceana	Pentwater	6 16N 17W	A. Busk - McMillen 3	14219	8/4	1585	42 acid	Traverse		8

DISCOVERIES

Of the 10 oil fields discovered, the Pentwater field, Oceana County, is the most important both from the standpoint of reserves and geological significance. At the end of 1948 there were 44 Dundee wells and 8 Traverse wells in the field, producing 3,500 barrels per day under voluntary proration. There are other Traverse fields in this part of the state, but there has been no other Dundee production for a distance of 35 miles south, or for 45 miles east. Thus, the Dundee now appears to be a potential producing formation over a large area in western Michigan where it has not been productive heretofore.

Dundee production in the Pentwater field is from a crystalline dolomite with the productive zone in the top 20 feet of the formation. The structure is an elongate dome with low relief and about 15 feet of productive closure. The overlying Traverse pool appears to cover a smaller area and has considerably more structural relief. The Traverse producing zone over a rather small area is much thicker than the Dundee producing zone with indicated larger per acre recoveries.

The Carter Oil Company is the principal producer in the field, and discovery came as a result of its core drilling.

The Eden field, Mason County, was discovered in July by the Superior Oil Company's B. Sippy *et al.* No. 1 in Sec. 26, T. 17 N., R. 16 W. This well was completed in the Traverse with an initial potential of 30 barrels per hour after acid. Subsequently, the Superior completed near-by producing wells in both the Dundee and upper Detroit River (Reed City zone). At year's end the Superior had 3 Traverse producers, 3 Detroit River producers, and one Dundee producer.

Although it now appears that the extent of the Eden field may be rather small, the fact that three formations are producing should lend further impetus to exploratory drilling in western Michigan.

The Eden field was also discovered as a result of core drilling.

Other discoveries of 1948 are tabulated in Table II.

EXTENSIONS AND FIELD DEVELOPMENT

The most important field extension of 1948 was the Sun Oil Company's George Garden A-1, Sec. 12, T. 25 N., R. 5 W., which extended the Beaver Creek field, Crawford County, 1½ miles northwest and into Kalkaska County. During the year 39 wells were drilled in this field on a 40-acre spacing pattern. There were approximately 3,000 acres proved at the end of the year. Production is from the Richfield zone in the lower part of the Detroit River formation (Devonian) at a depth of 4,200 feet.

Also active was the Geneva field, Van Buren County, where 40 wells were drilled during the year. Production is from the Traverse formation at a depth of 1,000 feet.

The Heath and South Hopkins fields, 1948 Allegan County discoveries, had 14 and 18 producing wells, respectively, at year's end, with development about completed.

TABLE III

EXPLORATORY WELLS, 1948 [1]

Type of Well	Total Wells	Basis for locating well: Subsurface Geology	Core Drill	Trend	Unknown or Non-Technical	Footage
New-field wildcats						
Successful	14	12	2			33,270
Dry	241	179	11	25	26	525,087
Totals	255	191	13	25	26	558,357
New-pool wildcats						
Dry	8	5			3	21,494
Deeper-pool tests						
Successful	1	1				683
Dry	7	7				21,400
Totals	8	8				22,083
Shallower-pool tests						
Successful	3	3				5,807
Outposts						
Successful	8	3	1	3	1	16,508
Dry	28	13		6	9	67,171
Totals	36	16	1	9	10	83,679
All exploratory wells						
Successful	26	19	3	3	1	56,268
Dry	284	204	11	31	38	635,152
Totals	310	223	14	34	39	691,420
Success percentage	8.4	8.5	21.4	8.8	2.6	

[1] Data for table furnished by Glenn C. Sleight, Sun Oil Company, Mt. Pleasant, Michigan, member of the Committee on Statistics of Exploratory Drilling.

TABLE IV

IMPORTANT DEEP TESTS

County	Well	Section Township Range	Permit Number	Total Depth (feet)	Oldest Formation Penetrated
Arenac (1)	Ervin Major - T. Rancourt No. 1	11 18N 4E	14199	4210	Bois Blanc (Dev.)
Berrien	Norman Nelson - Specking No. 1	32 7S 18W	13779	1822	Trenton (M. Ord.)
Gladwin	Sun Oil Co. & Pure Oil Co.-Sherman etal	1-6 19N 2W	14276	5217	Sylvania (Dev.)
Kalamazoo	Chas. Hook - C. & M. Hook No. 1	31 2S 12W	13483	3209	Trenton (Ord.)
Kalamazoo	Wing Bros. - C. Sweet No. 1	18 1S 12W	14483	1880	Niagaran (M. Sil.)
Mason	George Hanners. - J. Vasicek No. 1	16 17N 15W	13371	3381	Sylvania (Dev.)
Mason	John Thompson - J. R. Fuller No. 1	34 17N 15W	13645	3412	Sylvania (Dev.)
Midland (2)	Pure Oil Co. - G. Lilly No. 4	18 14N 2W	13899	4927	Sylvania (Dev.)
Newago (3)	Sun Oil Co. - G. Bradley No. 4	11 12N 13W	13816	6689	St. Peter (L. Ord)
Ogemaw (4)	Ohio Oil Co. & Pure Oil Co.- Reinhardt Consol. No. 1	35 22N 2E	12898	11012	Cambro Ordivician
Ogemaw	Sun Oil Co. - D. L. Maine No.1	19 24N 1E	14394	4300	Sylvania (Dev.)
Iosco (1)	Stork Oil Co. - F. W. Stork No. 1	3 22N 5E	12788	4375	Bois Blanc (Dev.)
Van Buren(5)	Fisher & McCall Oil Co. - Wiggins No.C-1	16 1S 14W	5614	1720	Sylvania (Lev.)
Washtenaw	H. L. Heath - A. Hoffman et al No. 1	12 1S 7E	14191	4469	Trenton (M.Ord.)

(1) Bois Blanc - Landes & Ehlers
(2) Deeper-pool test - Mt. Pleasant Field dry in Sylvania
(3) Deeper-pool test - Kimball Lake oil field dry St. Peter; plugged back for Traverse oil well
(4) Deeper-pool test - West Branch oil field dry in Cambro Ordovician
(5) Deeper-pool test - Bloomingdale oil field - drilled to Sylvania for brine disposal well.

EXPLORATION

The results of exploratory wells drilled during 1948 are indicated in Table III. Of the 310 exploratory wells drilled, 271 (87 per cent) were located by geological methods. Of the 14 wells located by core-drill information, 3 were successful for a 21.4 success percentage which is identical with the 1947 core-drill location success percentage.

Core-drilling activity continued to increase during 1948 with 444 geological test permits issued as compared with 289 during 1947. The western Michigan district was again the most active with 304 permits.

All the recent discoveries in western Michigan have been as a result of core drilling and it is probable that the increase in core-drill activity will result in a greater number of discoveries in that area during 1949.

One seismograph crew and one magnetometer operated in the state during a part of the year.

The deepest well drilled in Michigan was completed as a dry hole during February, 1948, at a total depth of 11,012 feet in the Cambro-Ordovician. This well was drilled by the Ohio Oil Company and the Pure Oil Company in the West Branch oil field, Ogemaw County, and no significant showings of oil or gas were encountered.

The Sun Oil Company drilled a deep test in the Kimball Lake field, Newago County, which was completed as a dry hole in the St. Peter (Lower Ordovician) at a depth of 6,689 feet. Although no showings of oil or gas were present, cores taken in the St. Peter showed a sand section of more than 100 feet, with some zones having excellent porosity and permeability.

At the end of 1948 the most important active deep test was the Ohio Oil Company's Steadman No. 1 in the Reed City field, Osceola County, and drilling at 7,900 feet.

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DEVELOPMENTS IN NORTH MID-CONTINENT IN 1948[1]

J. ROBERT BERG[2]
Wichita, Kansas

ABSTRACT

Approximately 69 new oil fields (and pools) were discovered in Kansas during the year 1948, most of which were named as new discoveries by the nomenclature committee of the Kansas Geological Society. This total of 69 discoveries included 59 new oil discoveries, 5 revivals of previously existent oil pools, and 5 new gas discoveries. Although most of the discoveries were new pool (46) and outpost (4) in classification, there were 14 new field or rank wildcat discoveries. In addition to the above discoveries, there were approximately 30 near-wildcat discoveries which extended already named and existent pools or fields.

For the second consecutive year, Rooks County was outstanding because of its marked wildcat activity and number of discoveries, 11 new pools or fields having been found in 1948 in comparison to nine discoveries for the year 1947.

There were no important developments, and only a few dry wildcats drilled during the year in the states of Iowa (0), Missouri (2), and Nebraska (9).

Kansas produced approximately 110,298,154 barrels of crude oil and casinghead gasoline during the year 1948, in comparison with the 1947 total of 106,060,019 barrels. Gas production for the year amounted to approximately 240 billion cubic feet, compared with the 1947 total of 183,527,266,000 cubic feet. This production of oil and gas resulted in an income of $301,113,718 (a record to date), of which $43,656,000 or 14½ per cent was paid to land owners and others as lease rentals and royalties.

The 1948 dry hole percentage (for all wells) of 37.3 per cent is higher than the ratio for 1947 (34.8 per cent) and 1946 (32.2 per cent), but lower than the ratio for 1945 (41.6 per cent).

INTRODUCTION

The area covered in this report includes the states of Kansas, Nebraska, Missouri, and Iowa. However, activity in all of these states except Kansas was negligible. The area covered in detail in this paper is essentially the same as covered by reports of previous years, and is the same area that is covered by the Wichita oil scouts in their weekly check meetings.

KANSAS

DRILLING ACTIVITY

Drilling activity increased considerably in Kansas during the year 1948, although the increase was only two-thirds of the national increase which amounted to 16.3 per cent for 1948. Kansas activity increased approximately 10.8 per cent with 3,284 completions of all wells in 1948, as compared with 2,845 completions in the year 1947. The net result of the total increase indicates a slight increase in oil well completions, a 4 per cent decrease in gas well completions, and a 3 per cent increase in dry holes. The Kansas dry-hole percentage (37.3 per cent) showed an increase over the past 2 years but was a decrease from the high dry-hole percentage of 41.6 in 1945. Comparative figures are shown in Table I.

In comparison with recent years, productivity of new oil-well completions decreased slightly for the year 1948, from 402 barrels average potential for

[1] Manuscript received, March 30, 1949.

[2] Associate professor of geology, University of Wichita.

TABLE I

Summary of Drilling Operations, 1946–1948

	1948	Percentage	1947	Percentage	1946	Percentage
Oil wells	1,677	51.1	1,407	49.4	1,029	53.0
Gas wells	382	11.6	450	15.8	286	14.8
Dry holes	1,225	37.3	988	34.8	627	32.2

1947 to 399 barrels average potential for 1948. For the second year, Rooks County was outstanding in wildcat discoveries, and the average potentials of the 11 discoveries in Rooks County, contributed largely to raising this average. The average potential of the Rooks County discoveries is approximately 1,000 barrels per day per well, and includes two discovery wells which had maximum potentials (3,000 barrels per day). Gas production added during 1948 totaled approximately 5,204, 869 cubic feet of gas. Comparative figures for the past several years are given in Table II.

TABLE II

Productivity Added, 1949–1948

Year	Oil Wells	Potentials		Gas Wells	MCF	Avg. MCF
		Bbls. Oil	Bbls. Avg.			
1941	1,253	1,727,593	1,379	75	797,011	10,626
1942	713	788,193	1,106	89	610,769	6,862
1943	796	716,777	900	30	320,420	10,681
1944	716	481,315	672	90	1,255,123	13,946
1945	659	298,390	453	208	2,957,170	14,217
1946	1,029	372,485	362	286	3,261,500	11,400
1947	1,407	564,936	402	450	4,115,000	9,114
1948	1,677	668,929	399	382	5,204,869	13,625

PRODUCTION

At the end of the year 1948, the accumulative production for Kansas was 1,889,399,154 barrels of oil, or 5.09 per cent of the accumulative total for the United States. The oil production in Kansas during the year 1948 was 110,298,154 barrels, or 5.46 per cent of the national total for 1948, which results in Kansas retaining fifth place among the oil-producing states of the country, a position it has held for the past 6 years.

The total production for 1948 of 107,925,654 barrels of oil and 2,372,500 barrels of casinghead gasoline, or a total production of 110,298,154 barrels for the year, represents an approximate increase of 4 per cent over the 1947 production of 106,060,019 barrels, and surpassed the previous high figure of the year 1943, when 108,441,648 barrels were produced. Gas production totaled approximately 240,195,558,000 cubic feet in 1948, as compared with the 1947 gas production of 183,527,266,000 cubic feet. Of the 1948 gas production 185,872,-590,000 cubic feet or 77 per cent were derived from the Hugoton field.

Income from the oil and gas industry reached an all-time high because of the

increased price of products and high rate of production, totaling $301,113,718 for the year 1948, in comparison to the 1947 income of $223,000,000. Income from the 110,298,154 barrels of oil and casinghead gasoline amounted to $288,993,718 and the value of the 240 billion cubic feet of gas produced accounted for more than $12,120,000.

Average oil and casinghead gasoline production for Kansas per day during 1948 was 302,187 barrels. Allowable oil production of the prorated wells was 290,000 barrels per day for the months of January through June, 295,000 barrels per day for the month of July, and 300,000 barrels per day for the remaining months of the year. The total potential of all wells in the state as of January 1, 1949, was 2,428,206 barrels, as compared with 2,835,651 barrels as of January 1, 1948, and 3,258,296 barrels as of January 1, 1947. The all-time high potential of 8,201,960 barrels was established in March, 1942, and since that time there has been a steady decline, although in recent years the rate of decline has lessened annually.

The most active counties, responsible for approximately 40 per cent of the state's oil production, were Barton, Russell, and Ellis counties, which produced 21,847,415 barrels, 13,638,374 barrels, and 12,742,936 barrels, respectively, or a total oil production for these three counties of 48,278,275 barrels of oil for the year 1948.

The most active counties responsible for more than 50 per cent of total well completions for the state include Barton, Butler, Russell, Ellis, Rice, and Rooks counties. Barton County was high with 429 completions including 40 per cent dry holes, and Butler County was second with 322 completions including 33 per cent dry holes.

Average depth drilled for all wells was 3,422 feet for oil wells, 2,862 feet for gas wells, and 3,489 feet for dry holes. The over-all average depth drilled for all wells was 3,383 feet. Significant during the year was the finding of two sources in Morton and Seward counties of deep condensate production which protends deeper drilling in the future.

EXPLORATORY DRILLING
(Wildcat Activity)

Exploratory drilling in Kansas in the year 1948 increased about 8 per cent over 1947, the over-all picture showing a slight increase in the number of oil discoveries, a slight decrease in the number of gas discoveries, and an increase in the number of dry holes. The total of exploratory wells of all classifications drilled in 1948 was 629 in comparison with a total of 534 exploratory wells in 1947. The classification of tests drilled with respect to oil, gas, or dry holes and their exploratory footages are shown in Table III. Total exploratory footage reached an all-time high of 2,282,424 feet.

Table IV indicates the figures for drilling of field and pool wildcats for 1948 in comparison with previous years.

The more active counties as shown by the total number of wildcat or exploratory completions per county in Kansas for the year 1948 are as follows: Rooks—57; Barton—51; Stafford—46; Ellis—42; Butler—36; Marion—23; Rice—22; and McPherson—20. These eight counties were responsibile for 57 per cent of all the New Field and New Pool tests drilled in Kansas last year.

Of the Kansas counties in which exploration was most active, the following data indicate their degree of success expressed as a discovery percentage, based on the number of new-field and new-pool tests drilled versus the fields and pool discoveries: Rice County showed the most success with 27 per cent discoveries;

TABLE III

EXPLORATORY STATISTICS FOR KANSAS, 1948

Classification	*Total Wells*	*Oil*	*Feet*	*Gas*	*Feet*	*Dry*	*Feet*	*Total Footage*
New field	211	10	42,586	4	18,460	197	774,703	835,749
New pool	310	56	185,785	4	17,824	250	884,785	1,088,394
Outpost	103	21	71,451	1	2,717	81	270,239	344,407
Deeper pool	3	—	—	—	—	3	8,356	8,356
Shallower pool	2	2	5,518	—	—	—	—	5,518
Totals	629	89	305,340	9	39,001	531	1,938,083	2,282,424

TABLE IV

EXPLORATORY WELLS, 1940–1948

Year	*Oil and Gas Wells*	*Total Feet*	*Dry Holes*	*Total Feet*	*Total Wells*	*Total Feet*
1940	23	75,142	122	408,887	145	484,020
1941	37	140,284	290	688,189	327	828,473
1942	34	122,041	299	1,039,753	333	1,161,794
1943	57	199,532	379	1,416,605	436	1,616,137
1944	66	256,376	428	1,586,558	494	1,842,737
1945	39	141,999	326	1,204,832	365	1,346,831
1946	35	126,154	279	1,004,900	314	1,131,054
1947	68	238,258	364	1,305,704	432	1,543,962
1948	74	264,655	447	1,659,488	521	1,924,143

followed by Russell, 23 per cent; Sedgwick, 21 per cent; McPherson, 20 per cent; Rooks, 19 per cent; Barton, 18 per cent; Barber, 14 per cent; Ellis, 12 per cent; Cowley, 10 per cent; Marion and Reno, 9 per cent; Pratt, 8 per cent; Stafford, Pawnee, and Summer, 7 per cent; the aforementioned counties are those in which 10 or more exploratory tests were drilled during the year 1948.

NEW POOLS

There were 69 field and pool discoveries during the year, 58 in western Kansas, and 11 in eastern Kansas, including 5 gas discoveries. Table V lists the new pools

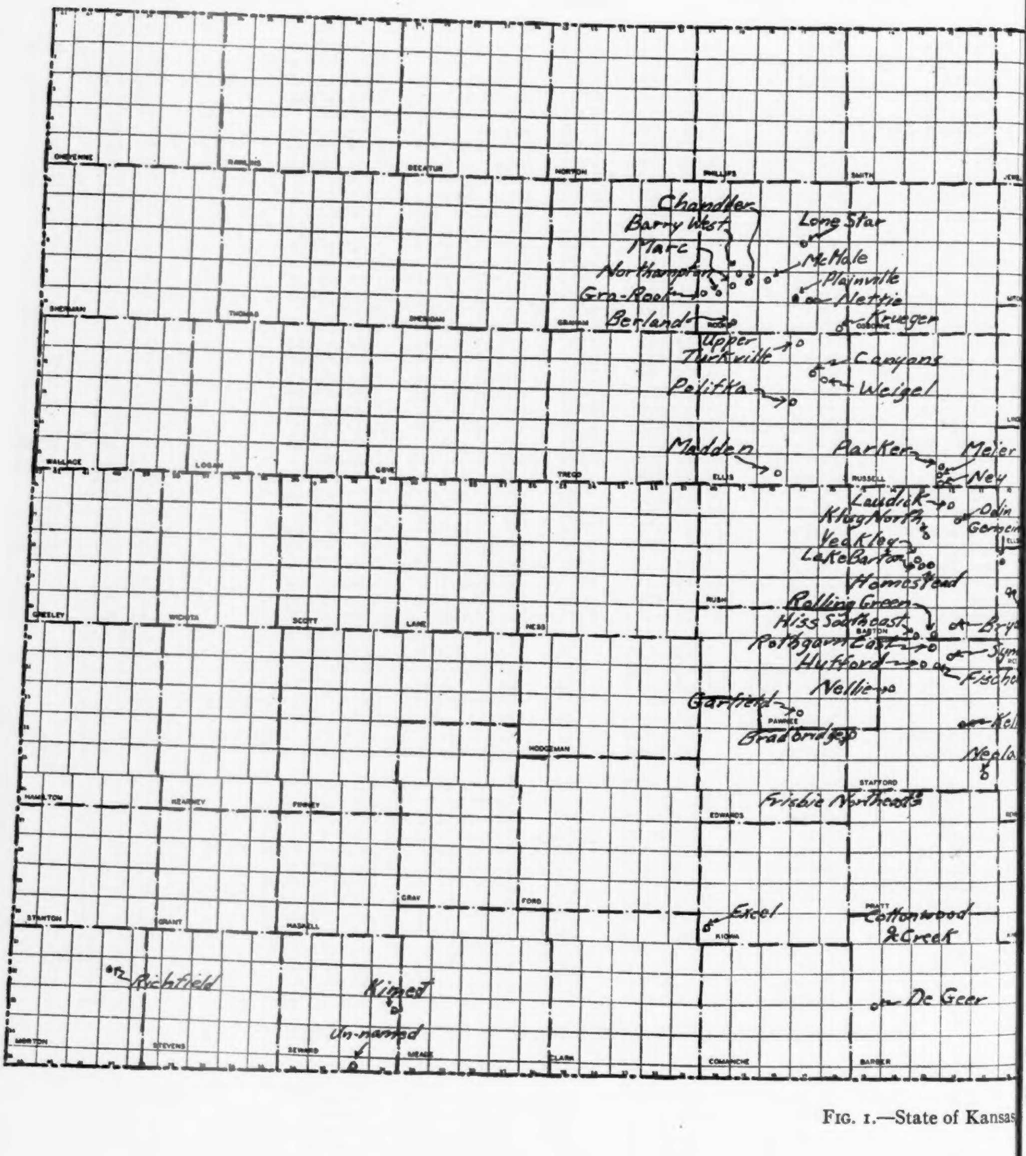
TABLE V

NEW FIELD AND POOL DISCOVERIES IN WESTERN KANSAS - 1948

POOL	COUNTY	SEC. T. R.	TOTAL DEPTH	PROD. FORM.	EXPLOR. METHOD	POTENTIAL Bbls. oil MCG Gas
Albion	Reno	14-26-6 W	4200	Miss. lime	Core drill	51 oil
Barry West	Rooks	4- 9-19W	3444	Arbuckle dol.	Subsurface	314 oil + 2% Wtr.
Battle Hill No.	McPherson	13-18- 1W	2826	Miss. lime	Subsurface	317 oil
Berland	Rooks	19-10-19W	3807	Arbuckle dol.	Subsurf. &Core drill	160 oil
Bowman North	Rice	16-19-10W	3357	Arbuckle dol.	Subsurface	25 oil
Bradbridge	Stafford	6-24-15W	4025	Arbuckle dol.	Unknown	4,350 gas
Bradfeldt (Rev.)	Rice	7-18- 9W	3235	Arbuckle dol.	Subsurface	50 oil
Bryant	Barton	27-20-12W	3405	Arbuckle dol.	Subsurface	171 oil
Burk	McPherson	7-18- 1W	2784	Miss. lime	Subsurface	169 oil
Canyons	Ellis	11-12-17W	3690	Lansing-K.C.	Subsurf. & Seismic	170 oil + 28%Wtr.
Chambers	Sedgwick	10-29- 2W	3550	Miss. lime	Core drill	35 oil
Chandler	Rooks	14- 9-19W	3462	Arbuckle dol.	Subsurf. & Seismic	3,000 oil
Corbin (Rev.)	Sumner	23-34- 2W	4481	Simpson sand	Subsurface	50 oil
Cottonwood Crk.	Barber	21-30-14W	4608	Simpson sand	Subsurface	4.5 gas
DeGeer	Barber	2-33-15W	5434	Viola lime	Core drill	4,718 oil
Excel	Kiowa	20-30-20W	5278	Mississippian	Core drill	219 oil
Fischer NW	Stafford	36-21-13W	3642	Arbuckle dol.	Subsurface	3,000 oil
Frisbie NE	Pratt	4-26-13W	4370	Lansing-K.C.	Seismic	720 oil + 45%Wtr.
Garfield	Pawnee	17-23-17W	4655	Kinderhook sd.	Seismic	25 oil
Gemeinhardt	Rice	18-18-10W	3297	Arbuckle dol.	Subsurface	282 oil
Gra-Rook	Rooks	30- 9-20W	3872	Arbuckle dol.	Subsurface	1,226 oil + Wtr
Hafferman East	Rice	5-19- 9W	3246	Arbuckle dol.	Subsurface	1,496 oil
Hiss Southeast	Barton	32-20-13W	3561	Arbuckle dol.	Subsurface	190 oil
Homestead	Barton	22-18-13W	3348	Arbuckle dol.	Subsurface	22 oil
Hufford	Stafford	33-21-13W	3770	Arbuckle dol.	Seismic	368 oil
Hunter North	Saline	8-16- 1W	2696	Miss. lime	Subsurface	60 oil + 10%Wtr.
Kelly	Stafford	35-23-12W	3875	Arbuckle dol.	Unknown	84 oil
Kismet	Seward	23-33-31W	7340	Lansing-K.C.	Seismic & Core drill	132 oil
Klug North	Barton	27-17-13W	3385	Arbuckle dol.	Subsurface	90 oil
Krueger	Rooks	35-10-16W	3683	Lansing-K.C.	Seismic	903 oil + Wtr
Lake Barton	Barton	21-18-13W	3389	Arbuckle dol.	Subsurface	28 oil + 10%Wtr.
Laudick	Barton	28-16-12W	3430	Arbuckle dol.	Subsurface	195 oil + 50%Wtr.
Lone Star	Rooks	4- 8-17W	3399	Arbuckle dol.	Subsurface	80 oil
Madden (Rev.)	Ellis	26-15-18W	3333	Lansing-K.C.	Subsurface	75 oil
Marc	Rooks	18- 9-19W	3595	Lansing-K.C.	Subsurface	91 oil
Maxwell	McPherson	17-18- 1W	2871	Miss. lime	Subsurface	41 oil
McHale	Rooks	8- 9-19W	3499	Arbuckle dol.	Subsurface	1,480 oil
Meier	Russell	30-15-12W	3331	Arbuckle dol.	Subsurface	252 oil
Nellie	Stafford	28-22-14W	3945	Lansing-K.C.	Seismic	480 oil
Neola (Rev.)	Stafford	15-25-11W	3921	Viola lime	Subsurface	30 oil
Nettie	Rooks	34- 9-17W	3545	Lansing-K.C.	Seis. & Core drill	168 oil
Ney	Russell	31-15-12W	3357	Lansing-K.C.	Subsurface	26 oil
Northampton	Rooks	26- 9-20W	3811	Arbuckle dol.	Subsurf. & Seismic	3,000 oil
Odin (Rev.)	Barton	3-17-12W	3328	Arbuckle dol.	Subsurface	182 oil +10% wtr
Parker	Russell	18-15-12W	3270	Arbuckle dol.	Subsurface	23 oil
Plainville	Rooks	31- 9-17W	3615	Lansing-K.C.	Core drill	12 oil
Polifka	Ellis	7-13-17W	3671	Arbuckle dol.	Subsurface	127 oil
Prosper	Rice	6-18- 9W	3243	Arbuckle dol.	Subsurface	84 oil
Richfield	Morton	17-32-40W	6561	Penn. sand	Seis. & Core drill	3,900 gas
Rolling Green	Barton	36-20-13W	3545	Lansing-K.C.	Subsurface	137 oil
Rothgarn East	Stafford	11-21-13W	3532	Arbuckle dol.	Seis. & Core drill	509 oil
Syms East	Stafford	21-21-12W	3575	Arbuckle dol.	Seis. & Subsurface	50 oil
Twin Mounds	McPherson	1-18- 2W	2851	Miss. lime	Subsurface	858 oil
UpperTurkville	Ellis	9-11-17W	3496	Lansing-K.C.	Unknown	25 oil
Weigel	Ellis	19-12-16W	3662	Lansing-K.C.	Subsurface	16 oil+88%
Welch West	Rice	6-21- 6W	3507	Miss. lime	Subsurface	40 oil(wtr)
Yeakley	Barton	17-18-13W	3325	Arbuckle dol.	Subsurface	100 oil
(UN-named)	Seward	15-35-32W	6314	Miss. lime	Core drill	? gas

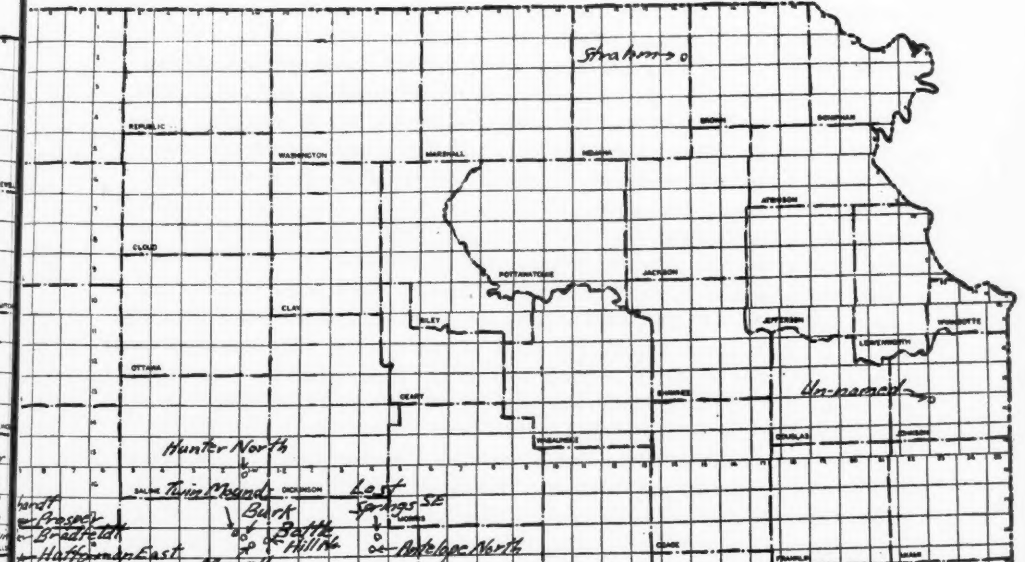
NEW FIELD AND POOL DISCOVERIES IN EASTERN KANSAS - 1948

POOL	COUNTY	SEC. T. R.	TOTAL DEPTH	PROD. FORM.	EXPLOR. METHOD	POTENTIAL
Antelope North	Marion	28-18- 4E	1852	Kansas City	Subsurface	35 oil+42%
Box	Cowley	28-30- 7E	2854	Miss. lime	Subsurface & Surface	7 oil(wtr)
Combs Northeast	Butler	27-29- 5E	2838	Bartlesville	Subsurface	50 oil
Enterprise	Cowley	35-33- 3E	3398	Bartlesville	Unknown	25 oil
Fairview	Sedgwick	8-26- 2E	2961	Miss. lime	Subsurface	1173 oil
Fairview North	Sedgwick	5-26- 2E	2974	Penn. sand	Subsurface	776 oil
Lost Springs SE.	Marion	10-18- 4E	2387	Miss. lime	Subsurface	12 oil+175%
Strahm	Nemaha	27- 2-14E	2879	Hunton dol.	Seismic	50 oil(wtr)
Towanda	Butler	5-26- 4E	2566	Viola lime	Subsurface	40 oil
White Cotton	Sedgwick	30-26- 2E	2961	Penn. sand	Subsurface	3000 oil
(Un-named)	Johnson	1-14-22E	1560	Penn. sand	Unknown	? gas



1948 oi

FIG. 1.—State of Kansas



1948 oil- and gas-pool discoveries.

Kansas

in western and eastern Kansas, respectively, discovered in 1948 and their geographic distribution is shown on the accompanying map (Fig. 1). Five of the discoveries are revivals of old pools, and are so indicated. Some of the pools have, since their discovery, been extended sufficiently to be combined with other pools.

Rooks County.—Rooks County was outstanding for the second consecutive year because of the marked wildcat activity and the number of pools discovered. Eleven new discoveries were named in this county, although Barton County followed closely with 9 discoveries. However, the Rooks County discoveries were exceptional in that many of the pools had high initial potentials, and the 11 discoveries had an average potential of 948 barrels of oil per day.

An outstanding discovery was the Northampton pool in Sec. 26, T. 9 S., R. 20 W. Drilled to the total depth of 3,811 feet, it was completed in the Arbuckle dolomite for a maximum potential of 3,000 barrels per day. This discovery was drilled on the basis of both subsurface and seismic information by independent operator Larry C. Hay *et al.* Other outstanding pools discovered in Rooks County included the Berland, Chandler, and McHale pools.

Barton County.—An outstanding discovery in Barton County, the largest oil-producing county in the state, was the Fischer Northwest pool. This discovery was drilled on the basis of subsurface information, drilled to the depth of 3,642 feet in the Arbuckle dolomite, and was completed for a maximum potential of 3,000 barrels of oil per day. This test was drilled by Nadel and Gussman and Larry Hay. To date, since the original discovery, 11 additional maximum wells have been drilled in this pool.

Barber County.—The DeGeer pool of Barber County, drilled by the Lion Oil Company on the basis of core-drill data, was completed as a Viola limestone producer with a bottom-hole-bomb potential of 4,718 barrels of oil per day. Total depth of the hole was 5,434 feet in the Arbuckle dolomite.

Sedgwick County.—Of possible significance was the discovery of 3 pools in Sedgwick County in the same township, and by the same operator. Independent operator John Gaty and the Penguin Petroleum Company drilled the 3 tests, which resulted in the discovery of the Fairview, Fairview North, and White Cotton pools, apparently all on the basis of subsurface information. The Fairview pool was completed for 1,173 barrels of oil per day from the Mississippian limestone. The Fairview North pool was completed with a potential of 776 barrels of oil per day from a Pennsylvanian sand. The White Cotton pool was completed in the Pennsylvanian Burgess sand as a maximum well with a potential of 3,000 barrels of oil per day.

Nemaha, Kiowa, Morton, and Seward counties.—Of possible future importance was the discovery of several relatively rank wildcat fields, miles from any current production, in the aforenamed counties. In Nemaha County, the Strahm field was discovered by the Carter Oil Company on the basis of seismic investigations covering several years. The well was completed for 50 barrels of oil per day from the Hunton dolomite.

In Kiowa County, the Excel field was discovered on the basis of core-drill information. The test was drilled to the total depth of 5,278 feet, and found 219 barrels of oil per day in the Mississippian limestone at 5,126 feet. The discovery was drilled by the Drillers Gas Company.

In Morton County, the Richfield field was discovered by the Stanolind Oil and Gas Company on the basis of core-drill information. The test was drilled to the total depth of 6,561 feet, and found 3,900,000 cubic feet of gas in a Pennsylvanian sand at 4,990 feet.

In Seward County, the Kismet field was discovered by the Stanolind Oil and Gas Company on the basis of core-drill and seismic information. The test was drilled to the total depth of 7,340 feet, and oil was found at 5,095 feet in the limestones of the Lansing-Kansas City groups, producing 132 barrels per day.

GEOPHYSICAL ACTIVITY

An analysis of all the wildcats drilled in Kansas during the year 1948 showed that the subsurface method of location is the most popular method in Kansas, although geophysical activity showed a marked increase for the third year. During the past year there were 7 seismic parties and 3 gravimetric parties in operation in Kansas, in comparison with 4 seismic and 2 gravimetric parties in 1947, and only one seismic party in operation in the year 1946.

A corresponding analysis of core-drill parties shows that 9 core-drill parties were in operation in 1948, in comparison with 5 parties in 1947, and 7 parties in 1946.

WELLS DRILLED TO PRE-CAMBRIAN BASEMENT

During the year 1948, 76 wells were drilled to the pre-Cambrian or basement complex, most of them in granite but many in quartzite, schist, or granite wash. Although most of the wells were for the purpose of salt-water disposal, several were exploratory tests. The average depth of the pre-Cambrian was 3,352 feet, the average total depth was 3,378 feet, and the average penetration was 26 feet. The total footage of the 76 wells drilled to the pre-Cambrian was 256,740 feet.

BULLETIN OF THE AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS
VOL. 33, NO. 6 (JUNE, 1949), PP. 892-904, 1 FIG., 4 TABLES

DEVELOPMENTS IN OKLAHOMA IN 1948[1]

DEAN C. WELLMAN[2]
Oklahoma City, Oklahoma

ABSTRACT

Although fewer outstanding discoveries were made in undeveloped regions of Oklahoma during 1948, substantial reserves were added by wildcat discoveries and extensions especially on the southwest flank and in the southeastern embayment of the Anadarko basin, the Ardmore basin, the Seminole area, and in east-central Oklahoma.

The outstanding development in Oklahoma during 1948, from a regional exploration point of view, was the continued success of exploratory drilling in the Elk City area, on the southwest flank of the Anadarko basin, which emphasized the geologic significance of "granite wash" production in Oklahoma. Discoveries in this area resulted in further leasing and exploration in the entire southwest Anadarko basin extending from Oklahoma into the Texas Panhandle.

Production of oil increased to 155,578,453 barrels, representing an increase of 9.9 per cent over the 1947 production. Total reserves of crude oil increased by 31 per cent. Production of marketed natural gas increased to 276,542,084,000 cubic feet and casinghead gas to 178,751,567,000 cubic feet, or 12 per cent over the gas marketed in 1947. Total reserves of natural gas were estimated to be practically the same at 11,332,445 million cubic feet at the end of 1948. In number of holes drilled Oklahoma ranked second with a total of 3,827, of which 713 were wildcats resulting in 94 new discoveries.

The deepest producing well in Oklahoma, one of the deepest in the world, was completed during 1948 in an Ordovician sandstone zone from 12,855 to 13,611 feet.

INTRODUCTION

The area here reviewed includes the entire state of Oklahoma. Though a few of the more outstanding exploratory tests are described in detail, descriptive material has been condensed as much as possible with the salient data relating to successful exploratory tests listed in Table II. Table III lists a few of the regionally important dry holes drilled during 1948.

TABLE I
COMPARISON OF WELLS DRILLED, 1941–1948

	Total	*Exploratory Tests*						*All Others*
		Oil	*Gas*	*Dry*	*Extension*	*New Formation*	*Total*	
1948	3,827	65	20	568	51	9	713	3,114
1947	3,977	73	33	708	49	41	904	3,073
1946	3,119	71	22	474	18	3	588	2,531
1945	2,351	51	22	301	32	12	418	1,933
1944	1,890	36	8	244	30	27	345	1,545
1943	1,187	34	10	254	23	15	336	851
1942	1,191	32	7	178	21	15	253	938
1941	2,162	39	2	190	13	27	271	1,891

DEVELOPMENT

Exploratory activity declined slightly from the high level attained during 1947; however, exploitation continued at approximately the same pace and the

[1] Manuscript received, May 5, 1949.

[2] Shell Oil Company. The writer is especially indebted to R. J. Cullen of the committee on statistics of exploratory drilling in furnishing a list from which the table on discoveries was prepared, and to Robert R. Wheeler for helpful suggestions in preparation of the manuscript.

production of oil and gas increased substantially. In total number of holes drilled Oklahoma ranked second, being surpassed only by Texas. Holes drilled in all categories total 3,827, of which 3,114 were pool wells and 713 wildcats, resulting in 94 new discoveries, with a discovery ratio of 13.2 per cent. Though significant reserves were added as a result of wildcat drilling in "proved" regions, there were relatively few developments in strictly wildcat areas which resulted in fields of large areal extent or in large additional reserves. Further increases in the price of crude continued to act as a stimulus to the drilling of hundreds of wells in the older producing regions of the state that in former years would have been uneconomic. Though not as successful as in 1947 the search continued in these regions for new producing zones by the deepening of old wells, and the drilling of outposts. A significant number of discoveries resulted from the reworking of old abandoned wildcat wells, especially in areas where new developments had indicated the possibility that production had been overlooked as a result of unsuspected formation characteristics. The high productivity of stratigraphic-trap reservoirs discovered since 1944 has resulted in increasing emphasis in the exploration for this type of accumulation. Some regions which were formerly unsuccessfully explored for purely structural traps are now receiving attention, with the discovery of "wedge-outs" or other stratigraphic-type traps the exploratory objective.

Production of oil increased to 155,578,453 barrels,[3] 9.9 per cent over the 1947 production, maintaining its position of fourth ranking state. Proved reserves of crude oil in new fields and pools discovered in 1948 were 39,746,000 barrels,[4] less than half of the new-field and pool reserves credited to Oklahoma in 1947, placing this state fourth in this category. Total reserves in new fields and pools and by extensions and revisions, were 452,632,000 barrels, bringing the total net reserves at the close of 1948 to 1,250,401,000 barrels. This represents an increase of 31 per cent over estimated reserves at the close of 1947.

Production of marketed natural gas increased to 276,542,084,000 cubic feet[5] and casinghead gas to 178,751,567,000 cubic feet or a total of 455,293,651,000 cubic feet, an increase of 12 per cent over the gas marketed in 1947. Total reserves at the close of 1948 were estimated to be practically the same as at the close of the previous year, at 11,332,445 million cubic feet.[6]

NEW FIELDS DISCOVERED

A large number of successful drilling ventures in 1948 resulted in important new reserves, and the realization of the magnitude of reservoirs discovered in 1947 and earlier years; only a few discoveries were of regional geologic significance however.

[3] Oil-production statistics from Oklahoma Corporation Commission.

[4] Oil-reserve statistics from American Petroleum Institute.

[5] Gas-production statistics from Gross Production Tax Division, Oklahoma Tax Commission.

[6] Gas-reserve statistics from American Gas Association.

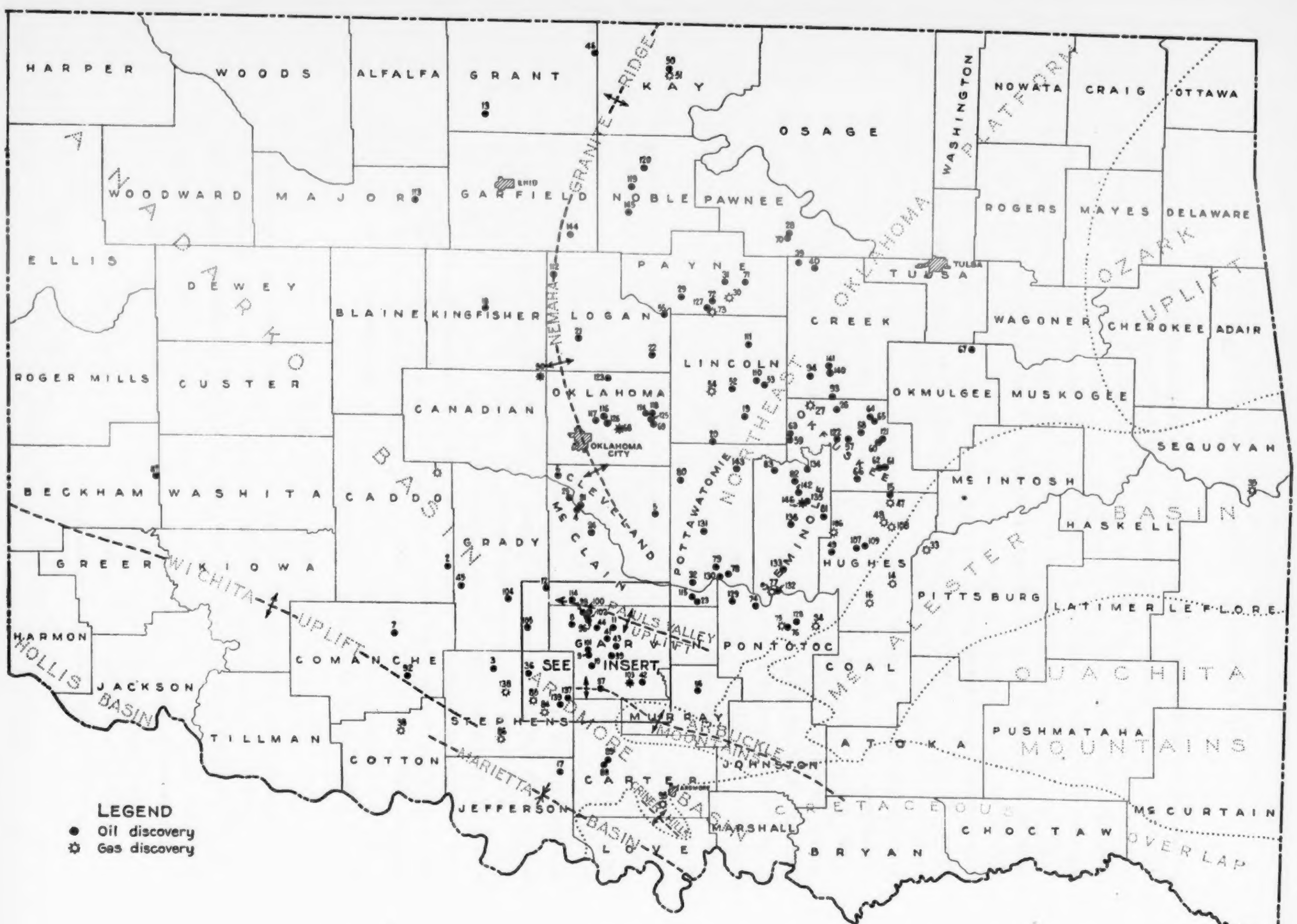
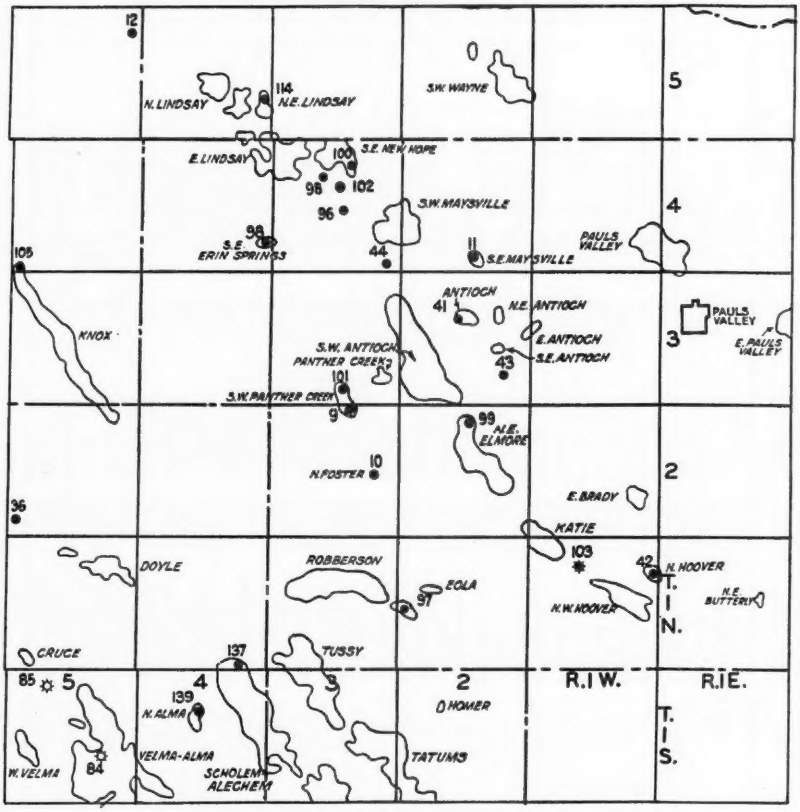


FIG. 1.—Map showing successful exploratory tests drilled in Oklahoma in 1948. Numbers refer to list of wells, Table II.

FIG. 1.—Map showing successful exploratory tests drilled in Oklahoma in 1948. Numbers refer to list of wells, Table II.



INSERT

FIG. 1A.—Insert shows 1948 discoveries in relation to oil pools of southeastern Anadarko basin ("Golden trend") and northern part of Ardmore basin.

Southwestern Anadarko basin.—The most important development during 1948 occurred in the Elk City field area on the southwest flank of the Anadarko basin approximately 10 miles north of the Wichita Mountains. Though this field was discovered during 1947, the full significance of the development was not evident until testing of a well 2 miles from the discovery indicated the possibility of a field of considerable areal extent.

The discovery well, the Shell Oil Company's Walters No. 1, center of NE. $\frac{1}{4}$, SW. $\frac{1}{4}$ of Sec. 14, T. 10 N., R. 21 W., was completed on November 18, 1947, flowing 469 barrels of distillate and 5,736,000 cubic feet of gas per day. The well pro-

TABLE II

New Field, New-Pool, Outpost, Deeper-Pool, and Shallower-Pool Discoveries

Index No.	Operator	Farm	Location	County	Compl. Date	Basis for Location	Total Depth	Producing Formation	Top Prod. Zone	Field Name	Initial Production
					NEW FIELD WILDCATS*						
1	Denver P-R	School Ld "A" 1	16-10N-9W	Caddo	11-30	Seismic	17,094	Penn.	12,600	Unnamed	5.mil.
2	Magnolia et al	Miller 1-A	14-6N-9W	Caddo	2-9	Seismic	13,046	Penn.	10,630	N. Cement	195 Bbls.
3	Tidewater	Scott 1	27-2N-7W	Stephens	9-15	Seismic	11,575	Penn.	7,902	SE. Marlow	370 Dist./8 mil.
4	Mid-Cont et al	Berry Est. 1	32-9N-3W	McClain	1-5	Seismic	9,830	Hunton	8,784	SE. Newcastle	422 Bbls.
5	Halliburton	Comfort-Ranch 1	4-8N-1E	Cleve.	8-30	Subsurface	5,843	Bartlesville	5,800	SE. Denver	105 Bbls.
6	Continental et al	Maruska Unit 1	16-10N-4W	Cleveland	8-3	Seismic	9,098	Hunton	8,145	W. Short Junction	254 Bbls.
7	Fisher et al	Fulbright 1-C	9-3N-11W	Comanche	7-20	Non-tech.	376	Permian	346	NW. Ft. Sill	2 Bbls.
8	Cities Serv.	Rogers "B" 1	25-4N-4W	Garvin	5-24	Seismic	12,598	Deese	7,975	SE. Erin Springs	12 Bbls.
9	Continental	Rose-Vose 1	3-2N-3W	Garvin	8-24	Seismic	8,645	Deese	8,050	SW. Panther Creek	280 Bbls.
10	Carter	Pickett-Huffman1	23-2N-3W	Garvin	11-3	Seismic	7,935	Deese	7,775	N. Foster	166 Bbls., ½" T.C.
11	Magnolia	Mason Burns 1	34-4N-2W	Garvin	11-3	Seismic	6,280	Bromide	6,249	SE. Maysville	419 Bbls., ½" T.C.
12	Gulf	Mainka 1	12-5N-5W	Grady	11-26	Seismic	13,250	Simpson	13,137	NE. Bradley	464 Bbls., 10 mil.
13	Payne & Phillips	Hall 1	9-25N-7W	Grant	3-2	Non-tech.	5,525	Oswego	5,114	E. Nash	6 Bbls., 1 mil.
14	Pure	Derrick 1	32-6N-11E	Hughes	7-27	Seismic	6,701	Cromwell	4,862	Unnamed	2.6 mil.
15	F. B. Murta	Ellis 1	6-9N-11E	Hughes	9-8	Subsurface	4,017	Cromwell	3,098	SW. Alabama	100 Bbls., ½" T.C.
16	Graben Gas Co	Hundley et al 1	29-5N-10E	Hughes	6-22	Subsurface	1,765	Penn.	1,756	N. Gerty	4 mil.
17	Amerada	Edwards 1	4-4S-4W	Jefferson	12-14	Seismic	3,147	Hoxbar	2,724	N. Ringling	212 Bbls.
18	Superior	Long 1	16-17N-7W	Kingfshr.	12-14	Seismic	9,026	Hunt-Simpson	8,050	SW. Dover	124 Bbls. Hunt & Simp
19	Falcon-Seaboard	Bierman 1	30-13N-5E	Lincoln	5-4	Subsurface	4,996	Wilcox	4,986	South Sparks	168 Bbls.
20	J. F. Smith	Jones 1	35-12N-3E	Lincoln	11-16	Subsurface	5,607	Basal PennSd	4,939	SW. Meeker	19 Bbls/7 hrs.
21	Barney Feagin	Noble 1	20-16N-3W	Logan	6-29	Non-tech.	6,301	Burbank	5,760	NE. Navina	152 Bbls.
22	Jordan Pet.	Faver 1	8-15N-1E	Logan	5-4	Non-tech.	5,018	Bartlesville	5,008	E. Evansville	88 Bbls.
23	J. J. Lynn	Bonner 1	30-5N-3E	McClain	3-22	Subsurface	4,204	Viola	4,175	E. Byars	50 Bbls.
24	Danciger	De Cordova 1	35-8N-3W	McClain	12-24	Subsurface	9,397	Simpson	9,373	SW. Goldsby	515 Bbls.
25	Magnolia	Ben Arnold 1	13-9N-4W	McClain	6-21	Seismic	9,433	Hunton	8,866	E. Newcastle	294 Bbls.
26	Falcon-Seaboard	Palmer 1	13-13N-8E	Okfuskee	12-29	Subsurface	3,436	Cromwell	3,415	SW. Welty	112 Bbls/112 bbls wtr.
27	Skelly	Bombarger 1	12-13N-7E	Okfuskee	6-22	Seismic	4,100	Dutcher	3,456	SW. Micawber	1.6 mil.
28	Mid-Continent	Robinson 1	1-20N-6E	Pawnee	10-26	Subsurface	3,025	Tucker	3,003	E. Maramec	25 Bbls.
29	Callery-Hurt	Blumer 1	28-18N-2E	Payne	11-9	Non-tech.	4,372	Skinner	4,331	SE. Ramsey	2 Bbls.
30	Jergins	Boyd 1	28-18N-4E	Payne	9-14	Subsurface	3,687	Skinner	3,475	SE. Ripley	2 mil.
31	Sun	Linsenmeyer 1	5-18N-4E	Payne	10-24	Subsurface	4,283	Wayside	3,368	SW. Ingalls	23 Bbls.
32	E. C. Clay & Sons	School Land 1	36-6N-2E	Pott.	1-6	Seismic	4,886	Simp. Dol.	4,566	SW. Wanette	20 Bbls/30 bbls wtr.
33	Otha H. Grimes	Kleinke 1	15-7N-12E	Pittsburg	4-6	Surface	4,268	Cromwell	4,245	NW. Scipio	17 mil.
34	Foran Knowles	Gipson-Johnson 1	30-4N-8E	Pontotoc	2-3	Non-tech.	842	Penn.	440	SW. Steedman	.1 mil.
35	Ark-Okla Gas	Brandt 1	24-10N-25E	Sequoyah	2-10	Surface	5,973	Penn.	1,735	NE. Redland	1.5 mil.
36	Tom Palmer	Amerada 1	31-2N-5W	Stephens	8-10	Seismic	10,078	Springer	10,039	SE. Bray	21 Bbls.

New Field, New-Pool, Outpost, Deeper-Pool, and Shallower-Pool Discoveries (Cont'd)

Index No.	Operator	Farm	Location	County	Compl. Date	Basis for Location	Total Depth	Producing Formation	Top Prod. Zone	Field Name	Initial Production
					NEW POOL WILDCATS*						
38	E. G. Whisnand	Phillips 1	15-2S-11W	Cotton	10-12	Trend	2,151	Penn.	1,963	Walters Dist.	7.44 mil.
39	Deardorf Oil	Conner 1	9-19N-7E	Creek	3-30	Subsurface	2,664	Skinner	2,615	SW. Jennings	30 Bbls.
40	Big Four	White 1	18-19N-8E	Creek	10-5	Subsurface	2,622	Red Fork	2,588	E. Cushing Dist.	40 Bbls.
41	Magnolia	Foreman 1	16-3N-2W	Garvin	2-9	Seismic	6,370	Bromide	6,350	Antioch	285 Bbls.
42	Carlock	Lewis Tuley 1	12-1N-1W	Garvin	8-3	Non-tech.	4,628	Deese	4,599	N. Hoover	303 Bbls., ½" T.C.
43	Anderson-Prichard	Freeman 1	26-3N-2W	Garvin	8-17	Subsurface	5,645	Deese	5,473	SE. Antioch	30 Bbls/6 hrs.
44	California	Graham 1	36-4N-3W	Garvin	12-29	Seismic	7,698	Bromide	7,550	SW. Maysville	113 BBls., ¼" T.C.
45	Halliburton	Goodwin 2	8-5N-8W	Grady	2-9	Subsurface	2,087	Fortuna	2,051	E. Cement	100 Bbls, ¼" T.C.
46	British-American	Corneil 1	24-28N-3W	Grant	8-10	Seismic	4,693	Wilcox	4,685	N. Webb	178 Bbls, 10/64" T.C.
47	H.T.M.Oil & Phps.	Meadors 1	18-9N-11E	Hughes	4-13	Seismic	3,008	Cromwell	2,978	E. Wetumka Dist.	2.3 mil.
48	Cities Serv.	Hicks 1	12-8N-10E	Hughes	4-20	Seismic	4,330	Booch	2,295	Greasy Creek	5.5 mil.
49	Wm. Clark Oils	Wysor 1	23-7N-8E	Hughes	6-8	Subsurface	2,810	Booch	2,789	W. Holdenville	15 Bbls.
50	Deardorf	Merhoff 1	12-27N-1E	Kay	4-6	Trend	4,225	Bartlesville	3,562	W. Banner	27 Bbls.
51	Carter	Kildare 1	13-27N-1E	Kay	5-11	Seismic	4,153	Skinner	3,494	NW. Garrett Dist.	8.5 mil.
52	Anderson-Prichard	Cunningham 1	22-14N-4E	Lincoln	5-18	Subsurface	5,024	Wilcox	5,018	Unnamed	16 Bbls/296 bbls wtr.
53	Deep Rock-Rooney	Dye 1	13-14N-5E	Lincoln	10-5	Subsurface	3,825	Prue	3,314	SE. Davenport	38 Bbls.
54	Falcon-Seaboard	Yancey 1	26-14N-3E	Lincoln	8-17	Subsurface	4,124	Prue	4,110	NW. Midlothian	4.15 mil.
55	Mohawk Dlg.	Marshall 1	14-17N-1E	Logan	11-3	Trend	5,160	Skinner	4,495	S. Coyle	16 Bbls.
56	Sohio	Kirby 1	19-1N-3E	Murray	6-15	Seismic	2,223	Simpson	1,920	Sandy Creek	8 Bbls., 17.8 Gty.
57	Texas Co.	Tanner 3	28-12N-9E	Okfuskee	2-10	Subsurface	3,296	Wapanucka	3,282	E. Castle	105 Bbls.
58	Wilcox Oil Co	Woodward 2	13-12N-9E	Okfuskee	2-24	Seismic	3,915	Wilcox	3,903	Morse Dist.	52 Bbls.
59	Sinclair-Prairie	Sheets 1	30-12N-7E	Okfuskee	3-16	Subsurface	4,381	Hunton	4,254	Garden Grove	55 Bbls.
60	B. B. Blair	McFadden 1	26-12N-10E	Okfuskee	3-16	Subsurface	3,202	Cromwell	3,128	Cary	60 Bbls.
61	W. M. Dunn	Morgan 1	36-11N-10E	Okfuskee	5-11	Non-tech.	2,843	Gilcrease	2,829	Unnamed	28 Bbls.
62	W. M. Dunn	Palmer 1	35-11N-10E	Okfuskee	9-21	Non-tech.	3,420	Cromwell	3,370	Bigham	8 Bbls.
63	J. E. Crosbie	Crain 1	19-12N-7E	Okfuskee	6-25	Seismic	4,331	Hunton	4,308	N. Garden Grove	284 Bbls.
64	Mid-Continent	Holderby 1	29-13N-10E	Okfuskee	8-17	Seismic	2,926	Cromwell	2,910	S. Haydenville	130 Bbls.
65	Mid-Continent	Harmon 1	33-13N-10E	Okfuskee	10-12	Seismic	2,972	Gilcrease	2,960	NE. Morse	124 Bbls.
66	Mohawk Dlg.	Foster 1	14-10N-9E	Okfuskee	11-30	Subsurface	3,290	Gilcrease	3,026	E. Bearden	20 Bbls.
67	Ed Kubat	Bingham 1	28-16N-14E	Okmulgee	10-26	Non-tech.	1,773	Dutcher	1,768	Unnamed	80 Bbls.
68	Harper-Turner	Kramer 1	13-12N-2W	Okla.	3-2	Trend	6,271	Skinner	6,210	SE. Munger	12 mil., 11 Dist.
69	Anderson-Carey	Fisher 1	5-12N-1E	Okla.	11-3	Trend	5,754	Misener	5,725	Jones	16 Bbls.
70	Mid-Continent	Privett 1	1-20N-6E	Pawnee	12-21	Subsurface	3,042	Bartlesv'le	2,935	E. Maramec	15 Bbls.
71	Blackwell	Bryant 1	6-18N-5E	Payne	6-8	Subsurface	3,715	Cleveland	2,845	N.March	61 Bbls.
72	Republic Nat	Lovell 1	35-18N-3E	Payne	7-7	Seismograph	3,950	Bartlesv'le	3,939	S. Mehan	10 Bbls/20 bbls wtr.
73	Deardorf	Howell 1	14-17N-3E	Payne	8-17	Trend	3,969	Red Fork	3,900	S. Cottingham	4.6 mil.
74	Sohio	Wilfong "A" 1	34-5N-5E	Pontotoc	3-15	Seismic	2,944	Viola	2,910	E. Beebe	98 Bbls.
75	Southwest Nat	Hallum 1	26-4N-6E	Pontotoc	2-3	Subsurface	1,150	Senora	872	SE. Hird	2 mil.
76	Delaney	Huddleston 1	25-4N-6E	Pontotoc	2-9	Subsurface	1,740	Senora	1,134	SE. Hird	14 Bbls.

New Field, New-Pool, Outpost, Deeper-Pool, and Shallower-Pool Discoveries (Cont'd)

Index No.	Operator	Farm	Location	County	Compl. Date	Basis for Location	Total Depth	Producing Formation	Top Prod. Zone	Field Name	Initial Production
					NEW POOL WILDCATS—(Continued)						
77	Jacques Mfg	Myers 1	9-5N-6E	Pontotoc	5-18	Subsurface	1,758	Senora	1,750	S. Tyrola	6 mil gas.
78	R. H. Brown	Hibbard 1	21-6N-4E	Pott.	4-13	Subsurface	3,746	Wanette	3,080	SE. Asher	6 Bbls.
79	J. G. Buell	Baukston 1	12-6N-3E	Pott.	6-15	Seismic	4,305	Viola	4,259	SW. Avoca	319 Bbls.
80	Earl Sadler	Gaddy 1	21-10N-2E	Pott.	6-	Non-tech.	6,078	Wilcox	5,986	Union Point	270 Bbls.
81	J. A. Ligon	Lassiter 1	4-8N-8E	Seminole	3-9	Subsurface	4,029	Cromwell	3,266	N. Wewoka	70 Bbls./20 bbl wtr.
82	E. P. Halliburton	Kiker 1	20-10N-7E	Seminole	11-23	Trend	3,810	Gilcrease	3,690	Unnamed	30 Bbls.
83	B. B. Blair	Madgett 1	4-10N-6E	Seminole	11-30	Subsurface	4,275	Misener	4,265	W. Keokuk	84 Bbls., ¼" T.C.
84	Skelly	Crosbie-Mudge 1	23-1S-5W	Stephens	6-8	Subsurface	8,540	Bromide	6,215	S. Velma	6 mil.
85	Carter	Creel 1	5-1S-5W	Stephens	9-8	Seismic	7,000	Deese	5,410	SE. Cruce	23 mil.
86	Phillips	Jeanette 1	25-2S-7W	Stephens	12-20	Unknown	2,939	Penn.	2,636	Comanche Lake	71 mil.
						OUTPOSTS*					
87	Union Prod	G. G. Music 1	25-10N-21W	Beckham	12-14	Seismic	9,708	Penn.	9,649	Elk City	237 Bbls., 3.76 mil.
88	Reyding Oil	George 1	29-3S-2W	Carter	3-9	Non-tech.	258	Permian	240	Wheeler	6 Bbls.
89	Roy Johnson	J. B. Moore 1	21-3S-2W	Carter	1-6	Trend	999	Permian	950	Wheeler	7 Bbls.
90	Ashland	Maidment 1	11-14N-5W	Canadian	12-30	Subsurface	6,884	Bartlesv'le	6,864	W. Edmond	4.6 mil., 92 Dist.
91	Mid-Continent	Harris 1	29-9N-3W	Cleve.	4-6	Seismic	9,234	Hunton	8,745	Newcastle	736 Bbls., ¼" T.C.
92	H. M. Horton etal	Clanton 1	1-1N-11W	Comanche	9-28	Trend	244	Permian	236	Lawton Dist.	2 Bbls.
93	T. N. Berry	Anthis 1	35-14N-8E	Creek	7-27	Subsurface	2,562	Skinner	2,520	Iron Post	35 Bbls., 20 bbl wtr.
94	F. B. Murta	Abraham 1	1-14N-7E	Creek	10-5	Trend	2,616	Prue	2,545	Big Pond	25 Bbls.
95	Samedan	Hedges 1	14-5S-1E	Carter	7-20	Trend	6,004	ArdmoreLk Sd	2,715	Ardmore	2.8 mil.
96	Texas	Donham	22-4N-3W	Garvin	12-21	Seismic	8,045	Deese	6,773	New Hope	70 Bbls.
97	Home Development	Ringer 2	19-1N-2W	Garvin	3-1	Trend	1,694	Pontotoc	1,580	Robberson	100 Bbls., ¼" T.C.
98	Carter	Hall 1	9-4N-3W	Garvin	7-7	Subsurface	7,157	Deese	6,935	New Hope	60 Bbls.
99	Phillips	Hillman 1	3-2N-2W	Garvin	7-20	Subsurface	7,145	Deese	6,550	Elmore	94 Bbls.
100	Sinclair	Adair 1	10-4N-3W	Garvin	8-24	Subsurface	7,067	Deese	6,903	New Hope	533 Bbls.
101	Phillips	Nesbitt 1	34-3N-3W	Garvin	10-5	Trend	8,293	Hart	8,060	Panther Creek	265 Bbls.
102	Sinclair	Dolly Neill 1	15-4N-3W	Garvin	10-19	Subsurface	7,026	Deese	6,832	SE. New Hope	715 Bbls.
103	Carter	Yeary-Vaughn 1	9-1N-1W	Garvin	11-9	Seismic	7,650	Hoxbar	4,729	SE. Katie	36.3 Dist., 10 mil.
104	Magnolia	V. M. Powers 1	29-5N-6W	Grady	11-3	Seismic	12,493	Springer	12,110	Chitwood	337 Bbls.
105	Texas	Hutson 1	31-4N-5W	Grady	1-9	Seismic	6,224	Penn.	4,138	NW. Knox	31 Bbls.
106	Jergins	Lowe 1	26-8N-8E	Hughes	1-13	Subsurface	4,208	Cromwell	3,208	E. Wewoka	9.5 mil.
107	H. A. Pruitt	Chestnut 1	14-7N-9E	Hughes	2-10	Subsurface	4,165	Gilcrease	3,360	Grief Creek	10 Bbls.
108	O. H. Grimes	Steil 1	17-8N-11E	Hughes	2-10	Subsurface	3,598	Gilcrease	2,946	Greasy Creek	1.2 mil.
109	Oliphant et al	Myers	7-7N-10E	Hughes	6-8	Trend	2,978	Booch	2,960	Grief Creek	98 Bbls.
110	Mitchell-Anderson	McCracken 1	10-14N-5E	Lincoln	1-27	Trend	3,408	Prue	3,395	S. Davenport	25 Bbls., 60 wtr.

New Field, New-Pool, Outpost, Deeper-Pool, and Shallower-Pool Discoveries (Cont'd)

Index No.	Operator	Farm	Location	County	Compl. Date	Basis for Location	Total Depth	Producing Formation	Top Prod. Zone	Field Name	Initial Production
					OUTPOSTS—(Cont'd)						
111	Blackwell O-G	Houseman	29-16N-5E	Lincoln	7-21	Trend	4,426	Prue	3,568	E. Parkland	10 Bbls.
112	Shell	Williams 2	32-19N-4W	Logan	3-2	Subsurface	6,138	Wilcox	6,000	Marshall	265 Bbls/12 hrs.
113	Superior	Jackson 1	34-22N-10W	Major	3-9	Subsurface	6,743	Manning Sd	6,705	Ringwood	43 Bbls.
114	Sinclair	Ethridge 1	25-5N-4W	McClain	1-20	Seismic	10,524	Simpson	8,094	N. Lindsay	94 Bbls.
115	Steelman	Smith 1	24-5N-2E	McClain	11-9	Subsurface	4,068	Viola	4,044	Johnsonville	120 Bbls.
116	Peppers Ref.	Eastland 1	32-13N-2W	Okla.	1-13	Subsurface	6,300	Unc.-Hunton	6,175	Witcher	150 Bbls.
117	Peppers Ref.	Hightower 1	1-12N-3W	Okla.	3-9	Subsurface	6,488	Unc.-Hunton	6,352	Witcher	150 Bbls.
118	L. C. Tharpe	Lovell 1	29-13N-1E	Okla.	4-27	Seismograph	6,897	Cleveland	4,886	Jones	147 Bbls.
119	B. B. Blair	Rawlings 1	9-22N-1W	Noble		Trend	4,603	Burbank	4,558	SW. Ceres	150 Bbls., 12/64" T.C.
120	Howell-Duncan	Osborne 1	13-23N-1W	Noble	11-30	Trend	4,445	Bartlesv'le	4,382	Seras	80 Bbls.
121	W.C. McBride	Smith 1	26-12N-10E	Okfuskee	9-14	Subsurface	3,064	Cromwell	3,051	Carey	106 Bbls.
122	Gen. Mach. Works	McKernan 1	25-12N-8E	Okfuskee	11-9	Subsurface	3,568	Cromwell	3,540	NE. Dill	41 Bbls.
123	Harper-Turner	Shannon 2	9-14N-2W	Okla.	3-23	Trend	6,043	Bartlesv'le	5,785	E. Edmond	34 Bbls.
124	H. O. Brown	Perry 1	30-13N-1E	Okla.	7-27	Trend	4,927	Cleveland	4,906	Jones	25 Bbls.
125	Anderson-Carey	Ogle 1	32-13N-1E	Okla.	7-27	Trend	4,890	Cleveland	4,858	Jones	182 Bbls.
126	Peppers Ref.	Keaton 1	4-12N-2W	Okla.	10-12	Trend	6,336	Hunton	6,256	Witcher	85 Bbls., 7/32" T.C.
127	H. F. Westcott	Gibson 1	10-17N-3E	Payne	4-27	Trend	4,060	Burbank	3,950	NE. Sporn	25 Bbls.
128	Delaney	Anderson 1	20-4N-7E	Pontotoc	6-22	Trend	1,522	Gilcrease	1,516	Steedman	25 Bbls.
129	W. H. Pine	Scoggins 4	27-5N-4E	Pontotoc	11-3	Trend	2,890	Hunton	2,380	Whitney	65 Bbls.
130	C. L. Brosius	McDaniels 1	30-6N-4E	Pott.	8-17	Trend	3,236	Wanette	3,220	S. Asher	40 Bbls.
131	Vierson-Cochran	Fundis-Atwater 1	28-8N-3E	Pott.	8-11	Subsurface	4,636	Hunton	4,610	S. Macomb	55 Bbls.
132	Jacques	Myers 1	10-5N-6E	Pott.	7-20	Subsurface	1,726	Senora	1,704	S. Tyrola	10 Bbls.
133	Bishop Oil Co.	Whitney 1	14-6N-6E	Seminole	5-4	Subsurface	2,405	Earlsboro	2,346	Traugh	10 Bbls., 30 wtr.
134	Mid-Continent	Hargrave 1	2-10N-7E	Seminole	5-11	Seismic	3,629	Cromwell	3,605	Sylvan	35 Bbls., 25 wtr.
135	Ashland O-R	Malery 1	14-9N-7E	Seminole	12-14	Subsurface	3,217	Booch	3,211	W. Bethel	12 Bbls.
136	Earl Sadler	Miller 1	18-8N-7E	Seminole	12-30	Subsurface	4,212	Hunton	3,995	N. Little River	115 Bbls.
137	Riddell	Calmes 1	35-1N-4W	Stephens	1-6	Trend	5,188	Springer	5,163	Sholem-Alechem	201 Bbls.
138	Mudge Oil	McCasland 1	30-1N-6W	Stephens	9-8	Subsurface	7,363	Hoxbar	7,040	NE. Duncan	455,000 cu.ft.
139	Samedan	Trotter 1	9-1S-4W	Stephens	9-21	Trend	5,424	Springer	5.125	Alma	79 Bbls.
					DEEPER-POOL TESTS*						
140	Bates-Springer	Chapman 1	27-15N-8E	Creek		Seismic	3,846	Wilcox	3,809	S. Depew	8 Bbls.
141	E. R. Billingslea	Wayman 13	22-15N-8E	Creek	5-18	Subsurface	3,820	Wilcox	3,789	SE. Depew	125 Bbls.
142	Gulf	Foster 1	4-9N-7E	Seminole	3-9	Subsurface	3,583	Gilcrease	3,565	Cheyarha	257 Bbls./6 hrs.
143	Phillips	Ailey 1	2-10N-4E	Pott.	4-20	Seismic	4,852	Simpson	4,844	E. Shawnee	40 Bbls.

New Field, New-Pool, Outpost, Deeper-Pool, and Shallower-Pool Discoveries (Cont'd)

Index No.	Operator	Farm	Location	County	Compl. Date	Basis for Location	Total Depth	Producing Formation	Top Prod. Zone	Field Name	Initial Production
					SHALLOWER-POOL TESTS*						
144	Big Chief	Casteel 1	12-20N-4W	Creek	10-5	Subsurface	5,565	Prue	5,146	E. Brown	60 Bbls.
145	Warren	Burgess 3	8-21N-1W	Noble	4-6	Subsurface	3,830	Layton	3,819	NW. Perry	150 Bbls., 18/64" T.C.
146	McIntyre et al	Brown 3	14-9N-7E	Seminole	6-8	Subsurface	2,763	Earlsboro	2,716	W. Bethel	1 mil., 3 Bbls.

*NEW-FIELD WILDCATS: A new-field wildcat is located far from producing pools, and on a structure which has not produced before.

*NEW-POOL WILDCATS: A new-pool wildcat is located to explore for new pools on a structure already producing, but off to one side of the presently producing area.

*OUTPOSTS: An outpost is located and drilled with the expectation of extending for a considerable distance the productive area of a partly developed pool. It is usually two or more locations distant from the nearest productive area.

*DEEPER-POOL TESTS: A deeper-pool test is an exploratory hole located within the productive area of a pool, or pools, already partly or wholly developed. It is drilled below the deepest such pool penetrated by it in order to explore for deeper unknown prospects.

*SHALLOWER-POOL TESTS: A shallower-pool test is exploratory only if drilled in search of some new productive reservoir, unknown but possibly suspected from data secured from other wells.

duced from perforations between 9,260 and 9,360 feet opposite an arkosic Pennsylvanian sandstone ("granite wash") zone. Location for the test was made on the basis of seismic exploration.

It was not until more than a year later that another test was completed in the area. The Union Producing Company's Music No. 1, N. ½, SE. ¼, NW. ¼ of Sec. 25, T. 10 N., R. 21 W., was located approximately 2 miles southeast of the discovery well. Because of its regional significance the test was watched closely; however, most observers had dismissed it as a dry hole by the time the drill had reached 9,600 feet, inasmuch as drill-stem tests in porous zones to that depth had yielded only small showings of gas and salt water. Subsequent testing in deeper sandstones, however, yielded oil, distillate, and gas; the well was completed at the total depth of 9,708 feet, producing initially at the rate of 237 barrels of distillate and 3,760,000 cubic feet of gas per day from perforations opposite a sandstone from 9,649 to 9,662 feet. This well was completed, December 14, 1948, and at the close of the year two additional successful tests were drilling in the area, one of them extending the field approximately one mile westward.

These outpost discoveries magnified considerably the geologic significance of "granite wash" production in Oklahoma, and the resulting impetus to further leasing and exploration far exceeded any other development in Oklahoma during 1948. The entire southwest Anadarko basin, and adjoining areas, extending from Oklahoma into the Texas Panhandle, were subjected to extensive lease and exploratory campaigns.

Southeastern embayment of Anadarko basin.—The most important development in the southeastern embayment ("Golden trend") of the Anadarko basin was the drilling of the Gulf Oil Company's Mainka No. 1, extending production basinward with the deepest producing well in Oklahoma, and one of the deepest in the world. This test, NW. ¼, NW. ¼, NE. ¼ of Sec. 12, T. 5 N., R. 5 W., was completed in Bromide (Simpson) sandstone, producing initially at the rate of 464 barrels of oil and 10 million cubic feet of gas per day from 13,137 to 13,250 feet. Location for this test was made on the basis of seismic exploration. Located 5 miles northwest of the nearest producing field, this test has offered new incentive to the basinward development of the "Golden trend" field. (Following completion, November 23, 1948, this well was deepened in January, 1949, and completed to produce from Bromide and Tulip Creek sandstones from 12,855 to 13,611 feet with initial daily potential of 1,068 barrels, through 13/64-inch choke.)

Other important discoveries in this province include the Carter Oil Company's Huffman No. 1 which opened the North Foster pool and the Carter and Continental oil companies' Rose-Vose No. 1, opening the Southwest Panther Creek pool. Both tests discovered oil in the Deese (Pennsylvanian) sand, substantially adding to the potential reserves of this area. Another important Deese sand discovery was that of C. L. Carlock at his Tuley No. 1, Sec. 12, T. 1 N., R. 1 W., with an initial daily potential of 303 barrels, opening the North Hoover pool. Seventeen discoveries and extensions in this province (Fig. 1, insert) emphasized the arcuate

pattern of Deese stratigraphic traps around the flanks of the Pauls Valley uplift.

Eastern flank—Anadarko basin.—An important extension of production westward from the Nemaha granite ridge occurred with the drilling of the Superior Oil Company's Long No. 88-16, SE. ¼, SE. ¼, SE. ¼, Sec. 16, T. 17 N., R. 7 W., approximately 20 miles northwest of the West Edmond field. Location was made on the basis of seismic exploration. This well was drilled to the total depth of 9,026 feet, below the base of the "Second Wilcox" sandstone, and dually completed to produce through perforations opposite the Hunton group from 8,050 to 8,080 feet, and the Simpson dolomite from 8,565 to 8,640 feet. Initial production from this discovery was 81 barrels of distillate in 9 hours and 4,665,000 cubic feet of gas per day from the Hunton, and 43 barrels of distillate in 15 hours and 3,854,000 cubic feet of gas per day from the Simpson dolomite. The Hunton productive zone is porous dolomite at the top of this group of formations, overlain by Chattanooga shale. In view of the regional setting analogous with West Edmond, on the eastern flank of the Anadarko basin, and of extension of Simpson dolomite production a considerable distance west, this well attracted particular attention with reference to regional potentialities of the northern part of the basin.

TABLE III

REGIONALLY IMPORTANT DRY HOLES DRILLED IN 1948

Location	*County*	*Operator*	*Farm*	*Total Depth Feet*	*Deepest Formation Drilled*	*Remarks*
24-26N-15W	Woods	Atlantic	Murray	7,378	Arbuckle	N. flank Anadarko basin
12-28N-26W	Harper	Gutowsky *et al.*	Rader	6,518	Miss.	NW. Anadarko basin
15-4N-4W	Garvin	Superior	McDaniel	12,549	Joins (Simp.)	
26-5N-9E	Hughes	Sohio	Bartlett	4,616	Cromwell	McAlester basin
12-5S-5W	Jefferson	Olson	Murphy	6,813	Simpson	Marietta basin
36-2N-6W	Stephens	Carter	Williamson	9,513	Deese	
34-10N-25W	Beckham	Pure	Taute	8,117	Granite	S. flank Anadarko basin
18-28N-12W	Alfalfa	Texas	Maxwell	6,050	Arbuckle	N. flank Anadarko basin
32-29N-10W	Alfalfa	Magnolia	Jack	5,494	Simpson	N. flank Anadarko basin
19-19N-11W	Blaine	Stanolind	Wildman	10,017	Simpson	Anadarko basin
26-1N-2W	Garvin	Sohio	Kennedy	9,987	Granite	Eola field
16-1S-6W	Stephens	Stephens	Grooms	9,527	Deese	
7-2S-3E	Murray	Sohio	Arbuckle	3,750	Joins	In Arbuckle Mountains
2-13N-6W	Canadian	Phillips *et al.*	Piedmont	9,197	Simpson	E. flank Anadarko basin
30-2N-5W	Stephens	Ohio	Reichman	11,205	Penn.	
9-1S-23W	Jackson	Sun	Wilson	7,133	Strawn	Hollis basin
10-6N-20ECM	Beaver	Stanolind	Schneider	6,700	Miss.	Oklahoma Panhandle
31-5N-10W	Caddo	Texas	Yates	14,498	Lower Penn.	S. flank Anadarko basin
4-4N-5W	Grady	Stanolind	Briscoe	15,184	Arbuckle	Prod. oil few months

Ardmore basin.—Development of the Velma and Scholem Alechem pools continued to highlight activity in the Ardmore basin, one of the most active provinces in the state and one of the most important from the standpoint of reserves. Exploratory programs were necessarily slow and difficult because of the extreme complexity of the geology, and the extent to which the region had been leased.

EXPLORATORY TESTS

Dry holes which appear to have particular regional geologic significance, in many instances because of their isolated location, are listed in Table III. In general, the relative geologic importance of any dry hole depends on a person's sphere of interest and whether considered from an economic or scientific viewpoint.

EXPLORATORY METHODS

A slight increase in seismic surveying was noted in 1948, with approximately the same regions of concentration: the Anadarko basin, the Ardmore basin, and north-central Oklahoma. Increased seismic activity was evident particularly in the far west and northwest counties of the Anadarko basin, the north-central counties, the southeastern portion of the Ardmore basin and the McAlester basin. Gravimetric work continued at about the same level. Structural core drilling continued to be confined mostly to western Oklahoma and stratigraphic core drilling to peripheral Arbuckle and Wichita mountain areas. Table IV summarizes the geophysical and core-drill work in 1948, in comparison with previous years.

TABLE IV

SUMMARY OF EXPLORATORY WORK, 1944–1948

Type	*1948*	*1947*	*1946*	*1945*	*1944*
			Crew Months of Work		
Seismograph	511¼	501	436	622¼	459¼
Gravimeter	37¾	37	96	106½	72
Torsion balance	—	—	—	5¾	—
Magnetometer	—	1	3	23	—
	Crew Months		*Number of Holes*		
Core drill	52¼	134	113	270	211

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DEVELOPMENTS IN TEXAS PANHANDLE IN 1948[1]

R. A. FICKEL[2]
Amarillo, Texas

ABSTRACT

The Texas Panhandle district, which includes the 25 northwest counties of Texas, is bounded on the north and east by Oklahoma and on the west by New Mexico. The south boundary of the district is formed by the south line of Parmer, Castro, Swisher, Briscoe, and Hall counties.

Drilling activities showed a marked increase over last year. The increase was directly attributed to oil wells with gas wells showing a slight decline. Production was increased by 2.1 million barrels of oil and 48 billion cubic feet of gas over last year. No new fields were discovered in 1948.

Seven important exploratory wells were drilled. All excepting one of these were drilled to granite.

Exploration was maintained at nearly the same level as in 1947. Both exploration and leasing were concentrated in the northeastern and southern parts of the district.

INTRODUCTION

The Texas Panhandle district, which includes the 25 northwest countries in Texas, is bounded on the north and east by Oklahoma and on the west by New Mexico. The south boundary of the district is formed by the south lines of Parmer, Castro, Swisher, Briscoe, and Hall counties.

The entire oil and gas production to date has been from a large interconnected reservoir from strata principally of Lower Permian age. This is termed the Panhandle oil and gas field from the north Moore County line southward, and the south Hugoton field northward from this line.

TABLE I

COMPARISON OF DRILLING ACTIVITIES IN 1948, 1947, AND 1946

Date	*Oil Wells*	*Gas Wells*	*Expl. Wells*	*Ext.*	*Dry*	*Total*
1948	445	154	11	0	40	639
1947	240	178	10	0	22	440
1946	149	123	14	2	45	317

DEVELOPMENT

The rapid increase in drilling activities is attributed to the increased value of crude oil and a greater availability of casing.

In 1948, 31.9 million barrels of oil and 882.7 billion cubic feet of gas were produced in the Panhandle district. This is an increase of 2.1 million barrels of oil and 48 billion cubic feet of gas over last year. No new pools were discovered in the Panhandle in 1948.

With one exception, all important exploratory wells drilled in the Panhandle district during 1948 were drilled to the basement complex.

[1] Manuscript received, March 2, 1949.

[2] Sinclair Prairie Oil Company.

TABLE II

IMPORTANT EXPLORATORY WELLS

	County	Operator	Farm	Location Sec.	Location Blk.	Location Sur.	Basis	Results	Total Depth (Feet)	Deepest Formations
1*	Castro	Sun Oil	Haberer 1	8	2	Halsell	Seis.	D&A†	9,125	Pre-Camb.
2	Castro	Sun Oil	Herring 1	46	T-4	Thomson	Seis.	D&A	10,500	Pre-Camb.
3	Deaf Smith	Humble	Stourbough 1	20	3N	1E	Seis. & Subsurf.	D&A	6,675	Pre-Camb
4	Donley	Honolulu	Ozier 1	55	C-6	GC&SF	Seis. & Core hole	D&A	5,893	Pre-Camb.
5	Parmer	Sunray	Kimbrough 1	23	Doude	Keefer	Seis.	D&A	9,432	
6	Roberts	Phillips	Carruth 1	66	2	I&GN	Seis.	D&A	11,432	Arbuckle
7	Roberts	Phillips	Jenkie 1	38	2	I&GN	Seis.	D&A	11,730	Pre-Camb.

* Numbers correspond with wells on map.
† D&A: dry and abandoned.

Although most of the important exploratory wells were drilled in the south two tiers of counties covering the Palo Duro basin, probably the two most important wells were the Phillips' deep tests, Jenkie No. 1 and Carruth No. 1, in south Roberts County. These two wells are located $3\frac{1}{2}$ miles apart on the steeply

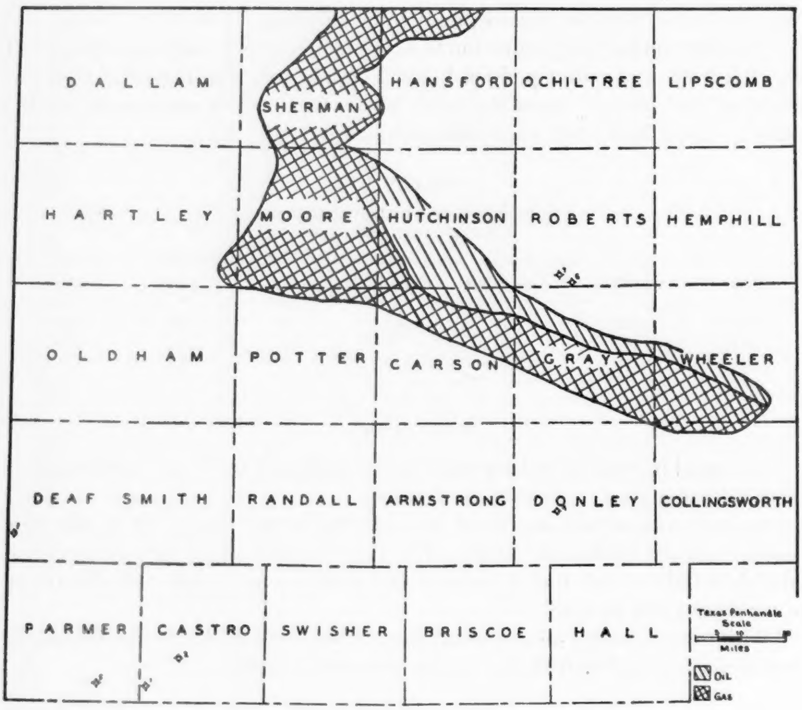

FIG. 1

dipping south flank of the Anadarko basin and were drilled deeper than 11,000 feet. The Jenkie reached granite; the Carruth stopped in the Arbuckle. Both wells encountered pre-Pennsylvanian strata above the Simpson of an age not yet definitely determined. In the Jenkie the pre-Pennsylvanian unconformity had eliminated nearly 800 feet of pre-Pennsylvanian strata that were present in the Carruth. The Jenkie has several good showings of oil in the Lower and pre-Pennsylvanian rocks, but excessive water eliminated any possible commercial production.

EXPLORATION AND LEASING

Geophysical exploration was maintained at nearly the same level in 1948 as in 1947, with a slight increase in gravity work and a slight decrease in seismic activity. In June, 1948, there were six seismograph parties, three gravity parties, three deep strata-testing rigs, and five shallow core drills operating. At the close of the year there were seven seismograph parties, three gravity parties, one magnetometer, three core drills, and three strata-testing rigs.

Both exploration and leasing were concentrated in the northeastern and southern part of the district.

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DEVELOPMENTS IN WEST TEXAS AND SOUTHEAST NEW MEXICO IN 1948[1]

CHARLES F. HENDERSON[2] AND CHARLES R. BARR[3]
Midland, Texas

ABSTRACT

There were 3,839 tests drilled in 1948 in West Texas and Southeast New Mexico. This is 982 more wells, or an increase of 29 per cent over 1947. In all, 469 exploratory tests were drilled, of which 131 were producers, a success of 27.9 per cent. Fifty-six new fields and thirty-six new pools were discovered.

For the new fields discovered, the credit is about equally divided between subsurface geology and seismic control. During 1948, in West Texas and Southeast New Mexico, seismic activity totaled 3,612 crew weeks, gravity work 614, and magnetic 138. Seismic concentration on the Central Basin platform was in Andrews and Gaines counties, Texas, and Lea County, New Mexico, but strong interest is being shown in the southern Midland basin in Crockett, Reagan, and Upton counties and on the Eastern platform, especially in Scurry, Coke, and Tom Green counties.

An important aspect of the 1948 development is the apparent beginning of a shift in interest away from the Central Basin platform. Important discoveries such as Vealmoor, Green, and Bronte, together with several minor discoveries, indicate a large area on the east flank of the Midland basin and on the Eastern platform in which prolific reef production may be expected from the Pennsylvanian. The Crossroads field extends the area of Devonian production 35 miles north and opens a new province of possible pre-Permian production.

INTRODUCTION

The West Texas and Southeast New Mexico area, as covered in this report (Fig. 1) comprises the eight southeastern counties in New Mexico, and Texas Railroad Commission Districts 7-C and 8 with the exception of Cottle, King, Runnels, and McCullough counties. The statistical information was compiled from the records of the weekly check meetings of both the West Texas and Southeast New Mexico Oil Scouts associations.

COMPARATIVE STATISTICS

In the year 1948 there were 3,839 tests drilled in West Texas and Southeast New Mexico; an increase of 29 per cent over 1947. This increase was largely in development drilling. Levelland continued to lead all other fields in activity with 531 successful completions, followed by Toborg and Sharon Ridge. At the close of 1948 there were approximately 29,100 producing wells in the area.

Depths ranged from 250 feet to 13,977 feet, and formations were tested down to the pre-Cambrian. Of the wells drilled, 469 were exploratory[4] and 3,370 were

[1] Manuscript received, March 19, 1949.

[2] Consulting geologist.

[3] Stanolind Oil and Gas Company.

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[4] Lahee's classification, including new-field wildcats, new-pool wildcats, deeper-pool tests, and outposts.

development. Of the exploratory tests, 131 produced for a success of 27.9 per cent, a decrease of about 5 per cent from 1947. Exploratory drilling resulted in the discovery of 56 new fields; 46 in West Texas and 10 in Southeast New Mexico (a success of 11.9 per cent), and 36 new pools; 29 in Texas and 7 in New Mexico. Subsurface and seismic information were nearly equally credited with the newly discovered fields.

The greatest concentration of discoveries was on the Central Basin platform. There were 24 new fields in this area alone with the remaining 32 divided among the other geologic provinces. The new pools and fields are indicated on the accompanying maps by arrows. Figure 1 shows all of the discoveries as well as all of the established fields. Figure 2 indicates only the pre-Permian producing localities.

Of the more than 300 fields in West Texas and Southeast New Mexico, more than a third have been tested down to and including the Ellenburger. Of the platform fields, which account for the greatest number of major structures, the percentage tested is considerably higher.

GEOPHYSICAL ACTIVITY

Geophysical activity of all kinds increased markedly in 1948. Emphasis was again placed overwhelmingly on seismic coverage over that by the gravimeter and the magnetometer. This is in part due to the fact that rather complete reconnaissance coverage by the latter two instruments was obtained by many companies some years ago.

Concentration of seismic effort is beginning to shift away from the Central Basin platform. This is partly the result of the coverage factor, and partly the unavailability of leases. Inasmuch as seismic activity tends to follow major discoveries in an area or province, we can understand the attention received by the Eastern platform, Midland basin, and Southeastern shelf. We can anticipate further interest here because of the widespread flush production being obtained from the reefs of the Pennsylvanian.

The discovery of Devonian oil in northern Lea County, New Mexico, opened a large new area of exploration. Crews have been covering this locality thoroughly since that time. Scarcity of available leases will force the oil companies to look west in both Texas and New Mexico for new provinces in the coming months, but activity will remain high in the established areas for some time.

GENERAL GEOLOGICAL DISCUSSION

PERMIAN

Discoveries in this area were about equally divided between Permian and pre-Permian formations. Very few of the Permian discoveries were from the upper half of the section. Continued activity in Reeves County resulted in two new Delaware Mountain discoveries in the vicinity of the Tunstill field. These new fields are of interest more as an indication of renewed activity in the Delaware basin than because of large potential reserves.

San Andres and Clear Fork successes accounted for most of the deeper Permian discoveries. There were two significant San Andres developments. The discovery of four new producing areas and the completion of numerous successful outposts in Cochran and Hockley counties, Texas, considerably enlarged the Slaughter-Levelland producing locality, and two major extensions to the Grayburg-San Andres South Cowden field of Ector County enlarged that field by approximately 5,000 acres. Clear Fork production was expanded in the Smyer area in eastern Hockley County by the successful completion of the Honolulu's Ellwood "A-13" No. 1, resulting in the discovery of the West Smyer field. Outposts to the Goldsmith "5,600" field indicate this to be a major Clear Fork reservoir. Other important discoveries include the South Keystone field in Winkler County and the Jordan-Tubb pool in Ector County, Texas.

PENNSYLVANIAN

The most spectacular and probably the most significant developments of the year, both from the standpoint of geology and economics, have been in the Pennsylvanian. Such prolific reef production, as in the Vealmoor field of Howard and Borden counties, the Arledge, Bronte, and San Benito fields of Coke County, the Green field of Tom Green County, and the North Snyder, Kelly, and Schattel fields of Scurry County, opens a major province of exploration. Pennsylvanian reefs must now be considered as important potential pay zones throughout most of the Eastern platform, eastern Midland basin, and Southeastern shelf. Feverish leasing and augmented geophysical and drilling programs over much of this territory promise a high level of activity during 1949. These discoveries come, fortunately, at a time when leases have become almost unobtainable on the Central Basin platform. The reef fields in Scurry and Tom Green counties have the added significance of being the first pre-Permian strikes in those areas.

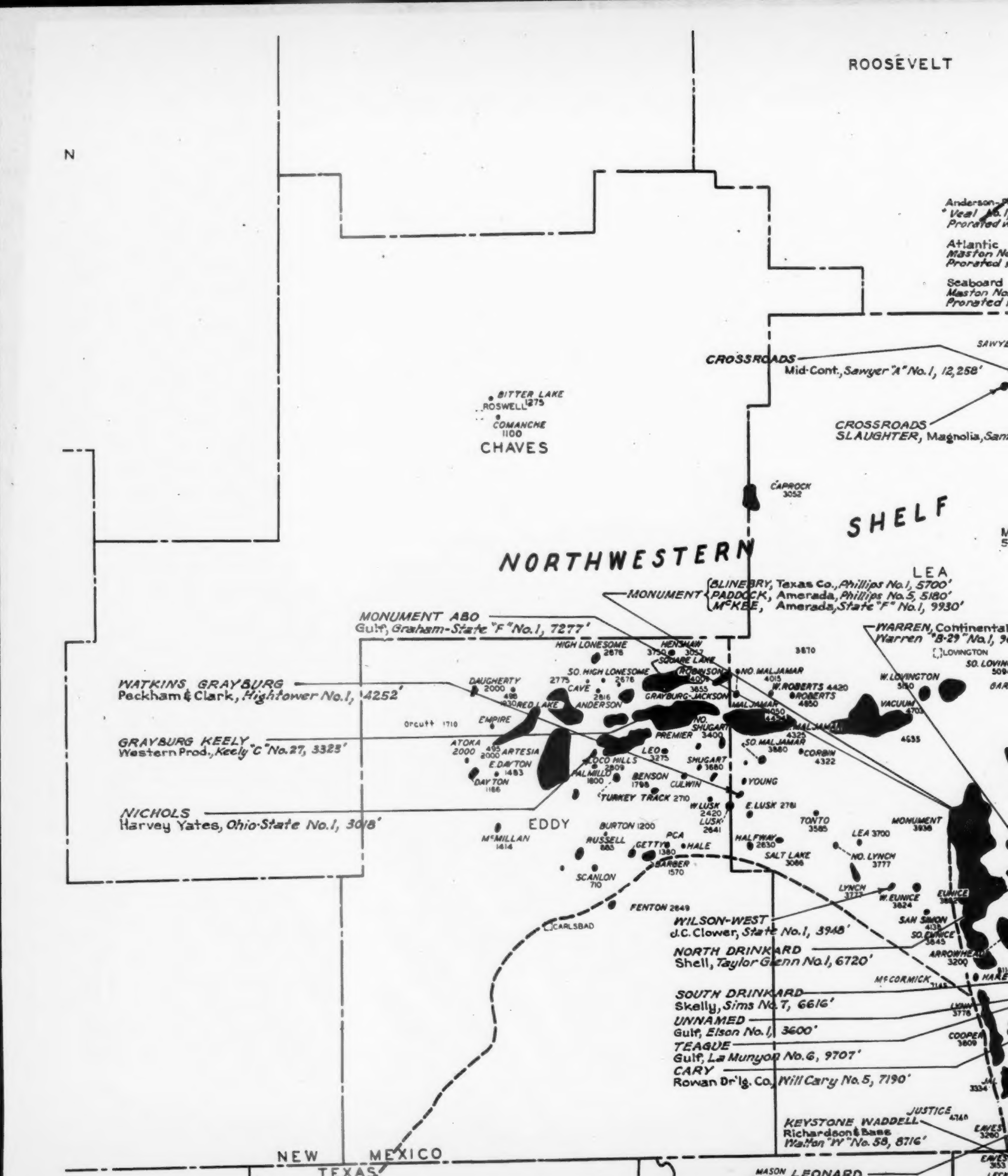
Discovery of a Pennsylvanian pool on the Benedum structure in eastern Upton and western Reagan counties, indicates a probable large reserve here, and will promote flank drilling on other structures in this general area.

DEVONIAN

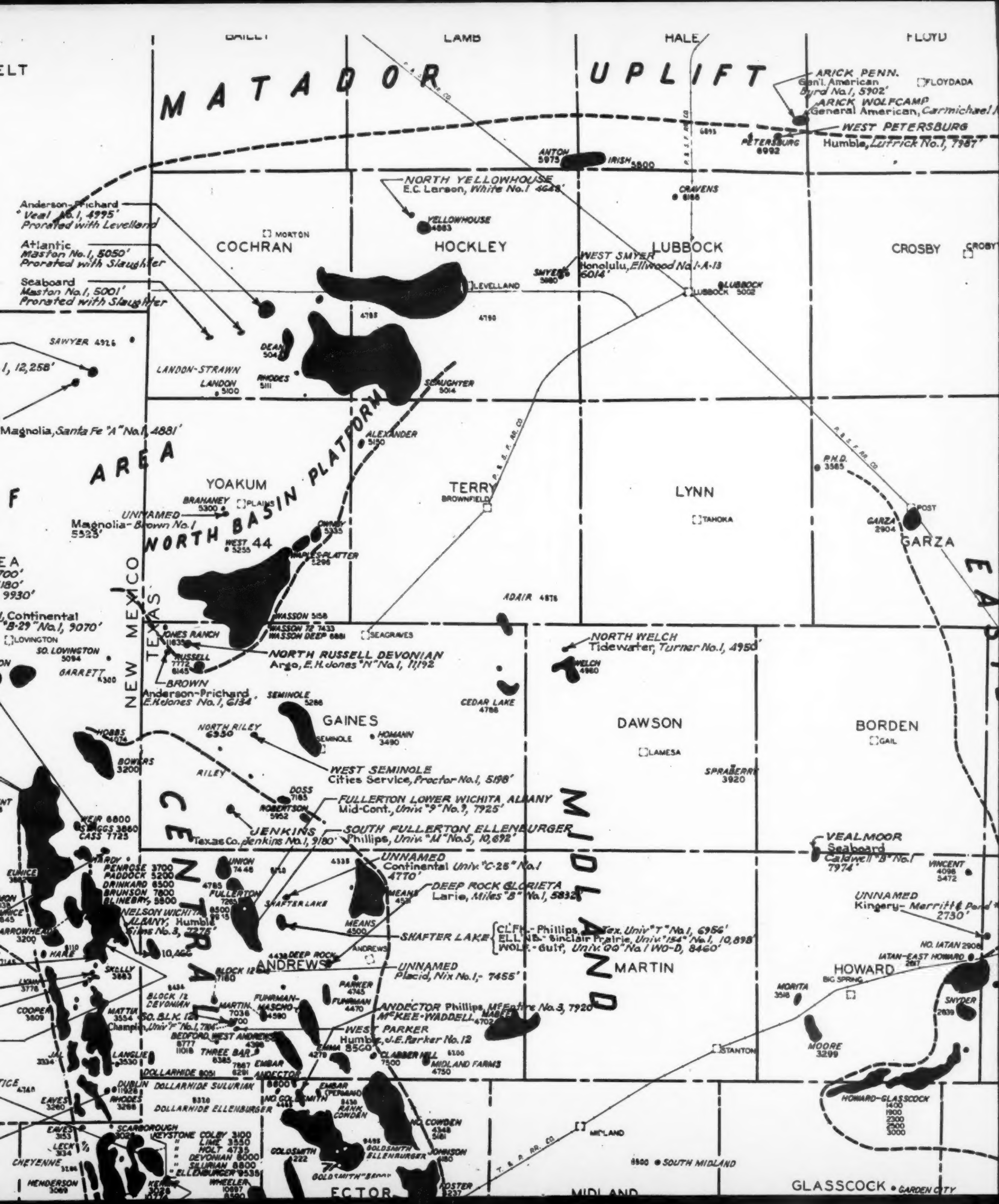
Three relatively small Devonian fields were found on the Central Basin platform in Andrews and Gaines counties, but the most important Devonian strike, and one of the outstanding discoveries of 1948, was the Mid-Continent's Sawyer "A" No. 1 in northern Lea County, New Mexico, which initiated the Crossroads field. This 35-mile north extension to known subsurface Devonian opens a new area of possible pre-Permian production. Seismic activity, leasing, and development were stimulated greatly, promising continued activity in the coming months.

SILURIAN

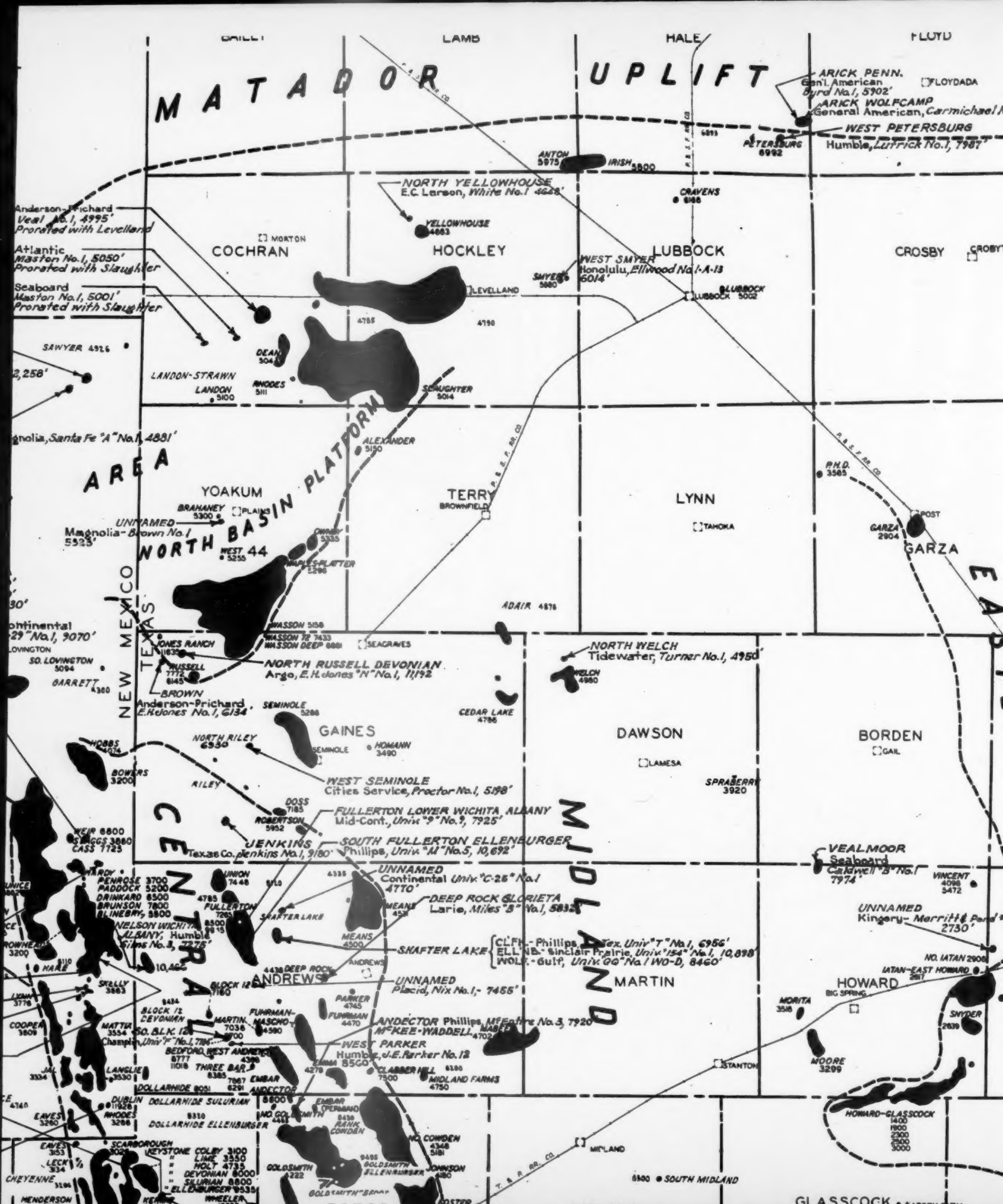
In addition to the continued development of the big Silurian reservoirs at Dollarhide in Andrews County and Keystone in Winkler County, oil was pro-



ROOSEVELT
N
Anderson-
Atlantic
Seaboard
CROSSROADS
Mid-Cont., Sawyer "A" No. 1, 12,258'
CROSSROADS
SLAUGHTER, Magnolia,
BITTER LAKE 1275
ROSWELL
COMANCHE 1100
CHAVES
CAPROCK 3052
SHELF
NORTHWESTERN
LEA
MONUMENT
BLINEBRY, Texas Co., Phillips No. 1, 5700'
PADDOCK, Amerada, Phillips No. 5, 5180'
McKEE, Amerada, State "F" No. 1, 9930'
MONUMENT ABO
Gulf, Graham-State "F" No. 1, 7277'
WARREN, Continental
LOVINGTON
WATKINS GRAYBURG
Peckham & Clark, Hightower No. 1, 4252'
GRAYBURG KEELY
Western Prod., Keely "C" No. 27, 3325'
NICHOLS
Harvey Yates, Ohio-State No. 1, 3018'
HIGH LONESOME 2878
HENSHAW
SQUARE LAKE
SO. HIGH LONESOME
CAVE
ANDERSON
GRAYBURG-JACKSON
NO. MALJAMAR
W. ROBERTS 4420
ROBERTS
MALJAMAR
W. LOVINGTON
VACUUM
DAUGHERTY
RED LAKE
EMPIRE
Orcutt 1710
PREMIER
NO. SHUGART
SO. MALJAMAR
CORBIN 4322
ATOKA 2000
ARTESIA
E. DAYTON
DAYTON
LOCO HILLS
PALMILLO
LEO
BENSON
SHUGART
CULWIN
YOUNG
TURKEY TRACK 2710
W. LUSK
LUSK
E. LUSK
TONTO
MONUMENT
EDDY
McMILLAN
BURTON 1200
RUSSELL
GETTY
PCA
HALE
BARBER 1570
HALFWAY
SALT LAKE
LEA 3700
NO. LYNCH
LYNCH
W. EUNICE
EUNICE
SCANLON 710
FENTON 2849
CARLSBAD
WILSON-WEST
J.C. Clower, State No. 1, 3948'
NORTH DRINKARD
Shell, Taylor Glenn No. 1, 6720'
SAN SIMON
SO. EUNICE
ARROWHEAD
McCORMICK
SOUTH DRINKARD
Skelly, Sims No. 7, 6616'
UNNAMED
Gulf, Elson No. 1, 3600'
TEAGUE
Gulf, La Munyon No. 6, 9707'
CARY
Rowan Dr'lg. Co., Will Cary No. 5, 7190'
COOPER
JAL
JUSTICE
KEYSTONE WADDELL
Richardson & Bass
Walton "W" No. 58, 8716'
EAVES
NEW MEXICO
TEXAS
MASON 3945
LEONARD
Leonard Oil Co.
Leonard No. 1, 5443'
CHEYENNE
HENDERSON
LOVING

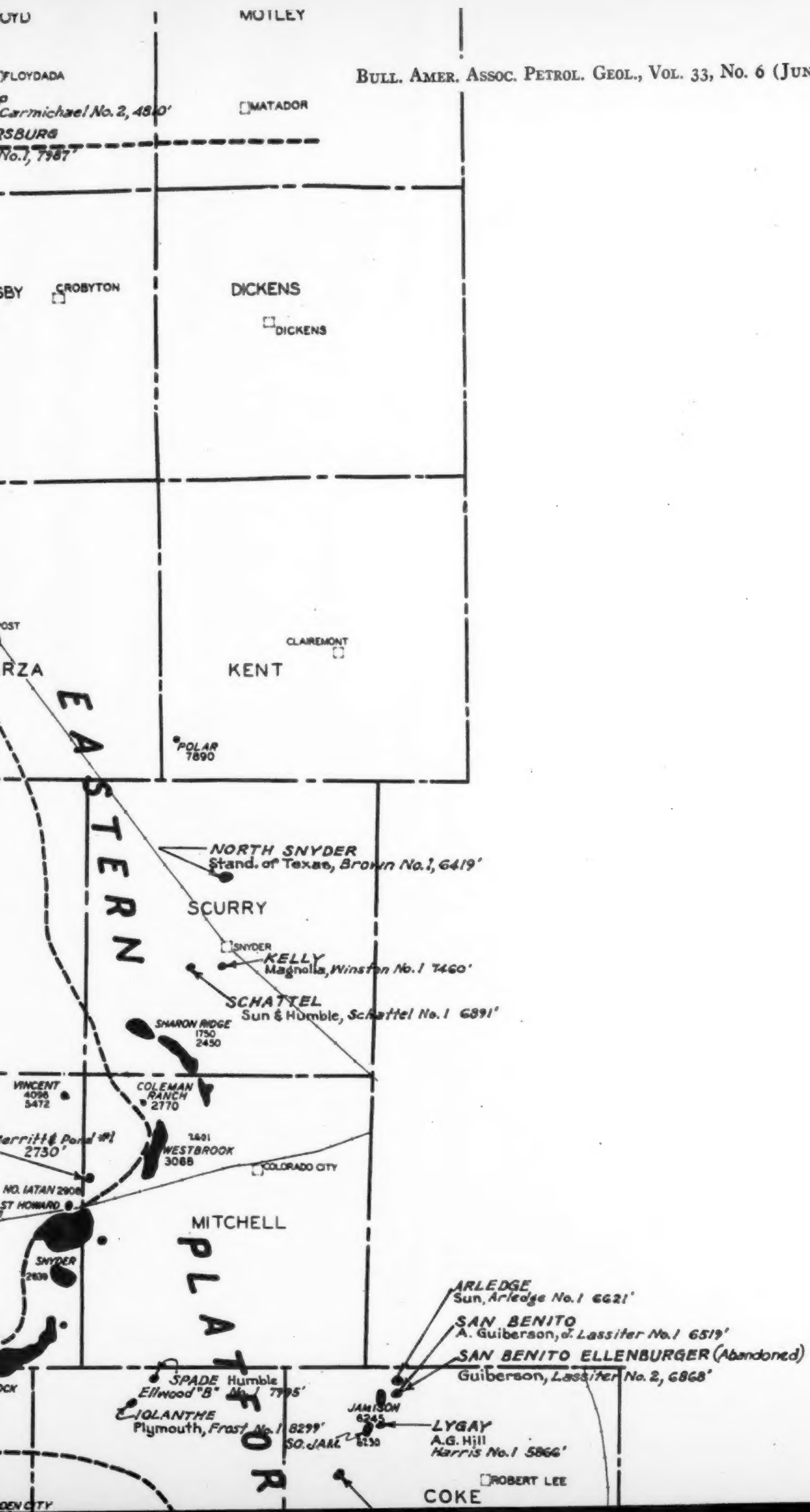


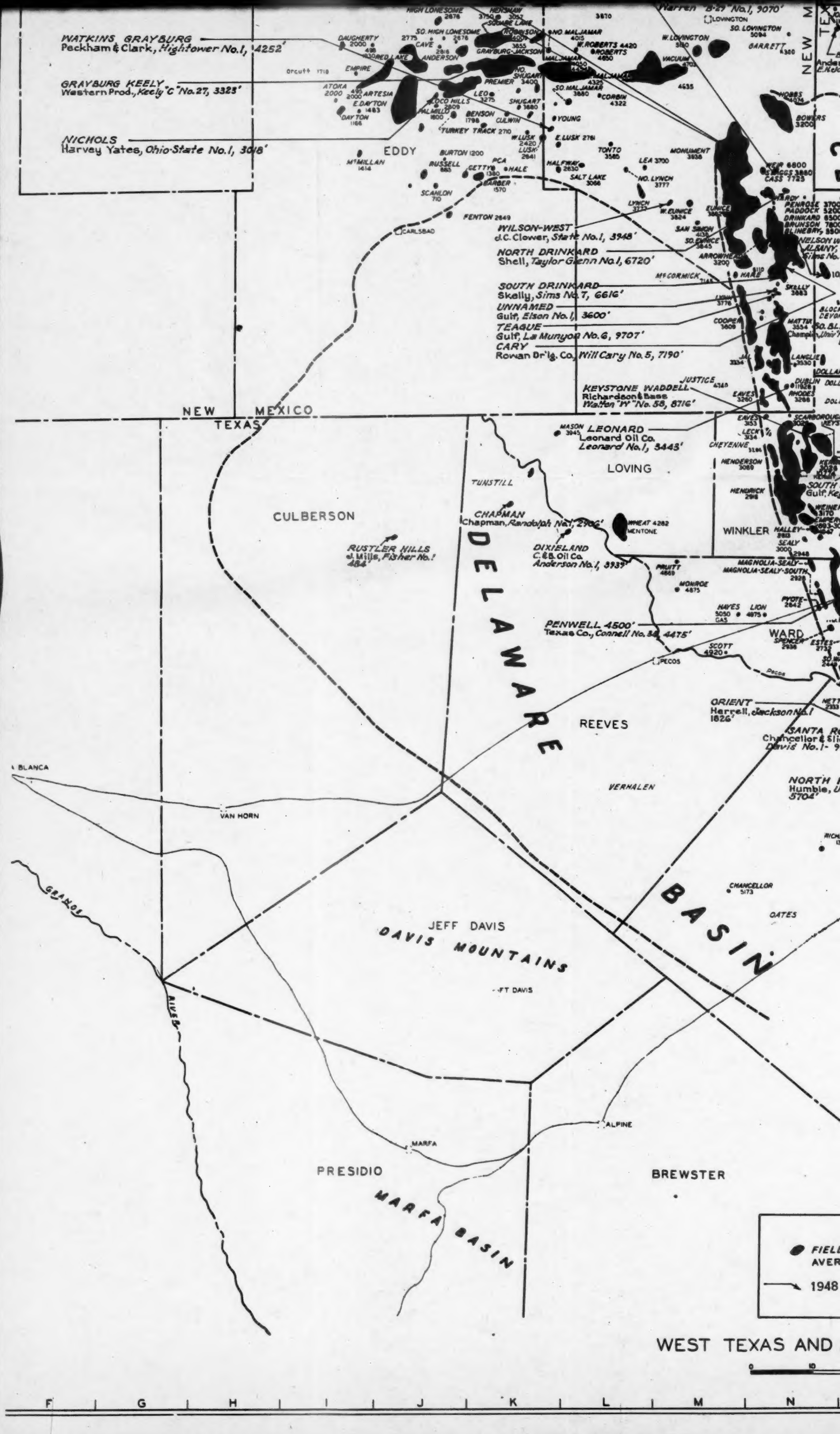
BAILEY
LAMB
HALE
FLOYD
MATADOR UPLIFT
ARICK PENN.
Gen'l. American
Byrd No.1, 5902'
ARICK WOLFCAMP
General American, Carmichael
FLOYDADA
WEST PETERSBURG
Humble, Lutrick No.1, 7987'
PETERSBURG
6992
ANTON
5975
IRISH 5800
NORTH YELLOWHOUSE
E.C. Larson, White No.1 4643'
YELLOWHOUSE
4683
CRAVENS
6166
Anderson-Prichard
"Veal No.1, 4995'
Prorated with Levelland
Atlantic
Maston No.1, 5050'
Prorated with Slaughter
Seaboard
Maston No.1, 5001'
Prorated with Slaughter
MORTON
COCHRAN
HOCKLEY
LUBBOCK
CROSBY
WEST SMYER
Honolulu, Ellwood No.1-A-13
6014'
SMYER
LEVELLAND
LUBBOCK
SAWYER 4926
LANDON-STRAWN
LANDON
5100
RHODES
5111
DEAN
SLAUGHTER
5014
Magnolia, Santa Fe "A" No.1, 4881'
AREA
ALEXANDER
5150
NORTH BASIN PLATFORM
YOAKUM
PLAINS
BRAHANEY
5300
UNNAMED
Magnolia-Brown No.1
5523'
WEST 44
5255
TERRY
BROWNFIELD
LYNN
TAHOKA
P.H.D.
3585
POST
GARZA
2904
GARZA
EAST
NEW MEXICO
TEXAS
ADAIR 4875
WASSON 5156
WASSON 72 7433
WASSON DEEP 6881
SEAGRAVES
LOVINGTON
SO. LOVINGTON
5094
GARRETT
JONES RANCH
RUSSELL
BROWN
Anderson-Prichard
E.H.Jones No.1, 6134'
NORTH RUSSELL DEVONIAN
Argo, E.H.Jones "N" No.1, 11,192
NORTH WELCH
Tidewater, Turner No.1, 4950'
WELCH
4960
SEMINOLE
5266
GAINES
SEMINOLE
HOMANN
3490
CEDAR LAKE
4786
DAWSON
LAMESA
BORDEN
GAIL
HOBBS
BOWERS
3200
NORTH RILEY
6350
RILEY
WEST SEMINOLE
Cities Service, Proctor No.1, 5198'
SPRABERRY
3920
DOSS
7165
ROBERTSON
5952
FULLERTON LOWER WICHITA ALBANY
Mid-Cont., Univ. "9" No.3, 7925'
JENKINS
Texas Co. Jenkins No.1, 9180'
SOUTH FULLERTON ELLENBURGER
Phillips, Univ. "M" No.5, 10,692'
MIDLAND
CENTRAL
WEIR 6800
SKAGGS 3860
CASS 7723
VEALMOOR
Seaboard
Caldwell "B" No.1
7974'
VINCENT
3472
UNNAMED
Continental Univ. "C-25" No.1
4770'
DEEP ROCK GLORIETA
Larie, Miles "B" No.1, 5832'
UNNAMED
Kingery-Merritt
2730'
EUNICE
HARDY
PENROSE 3700
PADDOCK 5200
DRINKARD 6500
BRUNSON 7800
BLINEBRY 5800
NELSON WICHITA ALBANY, Humble
Sims No.3, 7275'
ARROWHEAD
3200
FULLERTON
SHAFTER LAKE
MEANS
4500
SHAFTER LAKE
CLFK.-Phillips, Tex. Univ. "T" No.1, 6956'
ELL'NB.-Sinclair Prairie, Univ. "154" No.1, 10,898'
WOLF.-Gulf, Univ. "QQ" No.1 WO-D, 8460'
NO. IATAN
IATAN-EAST HOWARD
HARE
SKELLY
3683
DEEP ROCK
ANDREWS
ANDREWS
BLOCK 12
UNNAMED
Placid, Nix No.1, 7455'
MARTIN
HOWARD
BIG SPRING
MORITA
SNYDER
LYNN
COOPER
MATTIX
BLOCK 12 DEVONIAN
SO. BLK. 12
MARTIN
FUHRMAN-MASCHO
PARKER
FUHRMAN
4470
ANDECTOR Phillips, McEntire No.3, 7920'
McKEE-WADDELL
MABEE
WEST PARKER
Humble, J.E. Parker No.12
8560'
BEDFORD
WEST ANDREWS
THREE BAR
LANGLIE
EMBAR
EMMA
CLABBER HILL
MIDLAND FARMS
4750
STANTON
MOORE
3299
DOLLARHIDE 8051
DOLLARHIDE SULURIAN
DOLLARHIDE ELLENBURGER
ANDECTOR
EAVES
DUBLIN
RHODES
EMBAR
NO. GOLDSMITH
RANK
CONDEN
NO. COWDEN
HOWARD-GLASSCOCK
1400
1900
2300
2500
3000
SCARBOROUGH
KEYSTONE
COLBY 3100
LIME 3550
HOLT 4735
DEVONIAN 8800
SILURIAN 8600
ELLENBURGER 9535
LECK
CHEYENNE
GOLDSMITH
GOLDSMITH
ELLENBURGER
JOHNSON
MIDLAND
SOUTH MIDLAND
HENDERSON
WHEELER
ECTOR
FOSTER
MIDLAND
GLASSCOCK
GARDEN CITY



LAMB
HALE
FLOYD
MATADOR UPLIFT
ARICK PENN.
Gen'l. American
Byrd No.1, 5902'
ARICK WOLFCAMP
General American, Carmichael
FLOYDADA
WEST PETERSBURG
Humble, Lutrick No.1, 7987'
PETERSBURG 6992
ANTON 5975
IRISH 5800
NORTH YELLOWHOUSE
E.C. Larson, White No.1 4648'
YELLOWHOUSE 4683
CRAVENS
Anderson-Prichard
Veal No.1, 4995'
Prorated with Levelland
Atlantic
Maston No.1, 5050'
Prorated with Slaughter
Seaboard
Maston No.1, 5001'
Prorated with Slaughter
MORTON
COCHRAN
HOCKLEY
LUBBOCK
CROSBY
WEST SMYER
Honolulu, Ellwood No.1-A-13
6014'
SMYER 5880
LEVELLAND
LUBBOCK 5002
SAWYER 4926
LANDON-STRAWN
LANDON 5100
RHODES 5111
DEAN 5043
SLAUGHTER 5014
ALEXANDER 5150
Magnolia, Santa Fe "A" No.1, 4881'
AREA
NORTH BASIN PLATFORM
YOAKUM
BRAHANEY 5300
PLAINS
UNNAMED
Magnolia-Brown No.1
5523'
WEST 44 5255
TERRY
BROWNFIELD
LYNN
TAHOKA
P.H.D. 3565
GARZA 2904
GARZA
POST
NEW MEXICO
TEXAS
ADAIR 4876
WASSON 5150
WASSON 72 7433
WASSON DEEP 6881
SEAGRAVES
JONES RANCH
RUSSELL 7772 6145
BROWN
NORTH RUSSELL DEVONIAN
Argo, E.H.Jones "N" No.1, 11,192
Anderson-Prichard
E.H.Jones No.1, 6134'
NORTH WELCH
Tidewater, Turner No.1, 4950'
WELCH 4980
SO. LOVINGTON 5094
GARRETT 4360
SEMINOLE 5286
CEDAR LAKE 4785
GAINES
HOMANN 3490
DAWSON
LAMESA
BORDEN
GAIL
HOBBS
BOWERS 3200
NORTH RILEY 6930
RILEY
WEST SEMINOLE
Cities Service, Proctor No.1, 5198'
SPRABERRY 3920
DOSS 7185
ROBERTSON 5952
FULLERTON LOWER WICHITA ALBANY
Mid-Cont., Univ. "9" No.9, 7925'
JENKINS
Texas Co. Jenkins No.1, 9180'
SOUTH FULLERTON ELLENBURGER
Phillips, Univ. "M" No.5, 10,692'
MIDLAND
CENTRAL
WEIR 6800
SKAGGS 3880
CASS 7723
PENROSE 3700
PADDOCK 5200
DRINKARD 6500
BRUNSON 7800
BLINEBRY 5800
UNION 7448
FULLERTON
UNNAMED
Continental Univ. "C-25" No.1
4770'
VEALMOOR
Seaboard
Caldwell "B" No.1
7974'
VINCENT 4098 5472
DEEP ROCK GLORIETA
Larie, Miles "B" No.1, 5832'
MEANS 4500
SHAFTER LAKE
CLFK.-Phillips, Tex. Univ. "T" No.1, 6956'
ELL. NB.-Sinclair Prairie, Univ. "154" No.1, 10,898'
WOLF.-Gulf, Univ. GG No.1 WO-D, 8460'
UNNAMED
Kingery-Merritt
2730'
NO. IATAN 2900
IATAN-EAST HOWARD
NELSON WICHITA ALBANY, Humble, Sims No.3
DEEP ROCK
ANDREWS
UNNAMED
Placid, Nix No.1, 7455'
MARTIN
HOWARD
BIG SPRING
BLOCK 12
PARKER 4745
FUHRMAN-MASCHO 4500
ANDECTOR Phillips, McEntire No.3, 7920'
McKEE-WADDELL
MABEE 4702
WEST PARKER
Humble, J.E.Parker No.12
8560'
MORITA 3518
SNYDER 2630
COOPER 3809
LYNX 3770
MATTIX 3554
BLOCK 12 DEVONIAN
SO. BLK 12
MARTIN 7036
BEDFORD
WEST ANDREWS
THREE BAR
EMBAR
CLABBER HILL
MIDLAND FARMS 4750
STANTON
MOORE 3299
LANGLIE 3530
JAL
DOLLARHIDE
ANDECTOR
DOLLARHIDE SULURIAN
DOLLARHIDE ELLENBURGER
EAVES 3260
DUBLIN
RHODES 3288
NO. GOLDSMITH
RANK COWDEN
NO. COWDEN 4348 5181
HOWARD-GLASSCOCK 1400 1800 2300 2500 3000
EAVES 3153
LECK
SCARBOROUGH
KEYSTONE COLBY 3100
LIME 3550
HOLT 4735
DEVONIAN 8000
SILURIAN 8600
ELLENBURGER 9535
MIDLAND
CHEYENNE
HENDERSON 3069
WHEELER
GOLDSMITH 4222
GOLDSMITH ELLENBURGER
JOHNSON
FOSTER
SOUTH MIDLAND
ECTOR
MIDLAND
GLASSCOCK
GARDEN CITY
HARDY

Bull. Amer. Assoc. Petrol. Geol., Vol. 33, No. 6 (June, 1949), Henderson and Barr, Fig. 1





WATKINS GRAYBURG
Peckham & Clark, Hightower No.1, 4252'
GRAYBURG KEELY
Western Prod., Keely "C" No.27, 3323'
NICHOLS
Harvey Yates, Ohio-State No.1, 3018'
EDDY
CARLSBAD
WILSON-WEST
J.C. Clower, State No.1, 3948'
NORTH DRINKARD
Shell, Taylor Glenn No.1, 6720'
SOUTH DRINKARD
Skelly, Sims No.7, 6616'
UNNAMED
Gulf, Elson No.1, 3600'
TEAGUE
Gulf, La Munyon No.6, 9707'
CARY
Rowan Dr'lg. Co., Will Cary No.5, 7190'
KEYSTONE WADDELL
Richardson & Bass
Walton "W" No.58, 8716'
NEW MEXICO
TEXAS
LEONARD
Leonard Oil Co.
Leonard No.1, 3443'
LOVING
WINKLER
CULBERSON
CHAPMAN
Chapman, Randolph No.1, 2906'
RUSTLER HILLS
J. Mills, Fisher No.1
484
DIXIELAND
C.&B. Oil Co.
Anderson No.1, 3937'
DELAWARE
PENWELL 4500'
Texas Co., Connell No.38, 4475'
WARD
PECOS
ORIENT
Harrell, Jackson No.1
1826'
REEVES
VERHALEN
VAN HORN
BASIN
CHANCELLOR
5173
OATES
JEFF DAVIS
DAVIS MOUNTAINS
FT DAVIS
GRANDE
RIVER
ALPINE
MARFA
PRESIDIO
MARFA BASIN
BREWSTER
WEST TEXAS AND
F G H I J K L M N

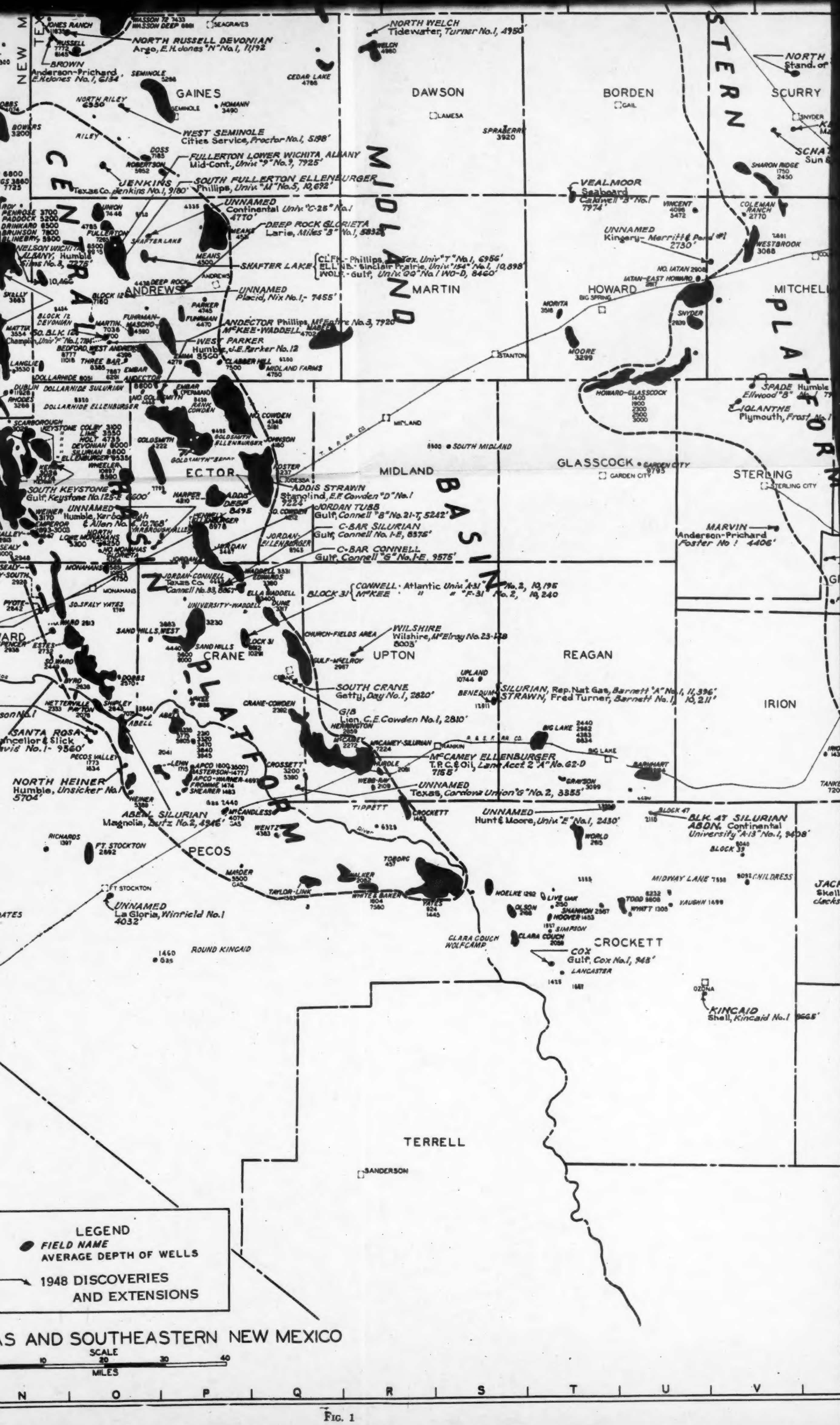
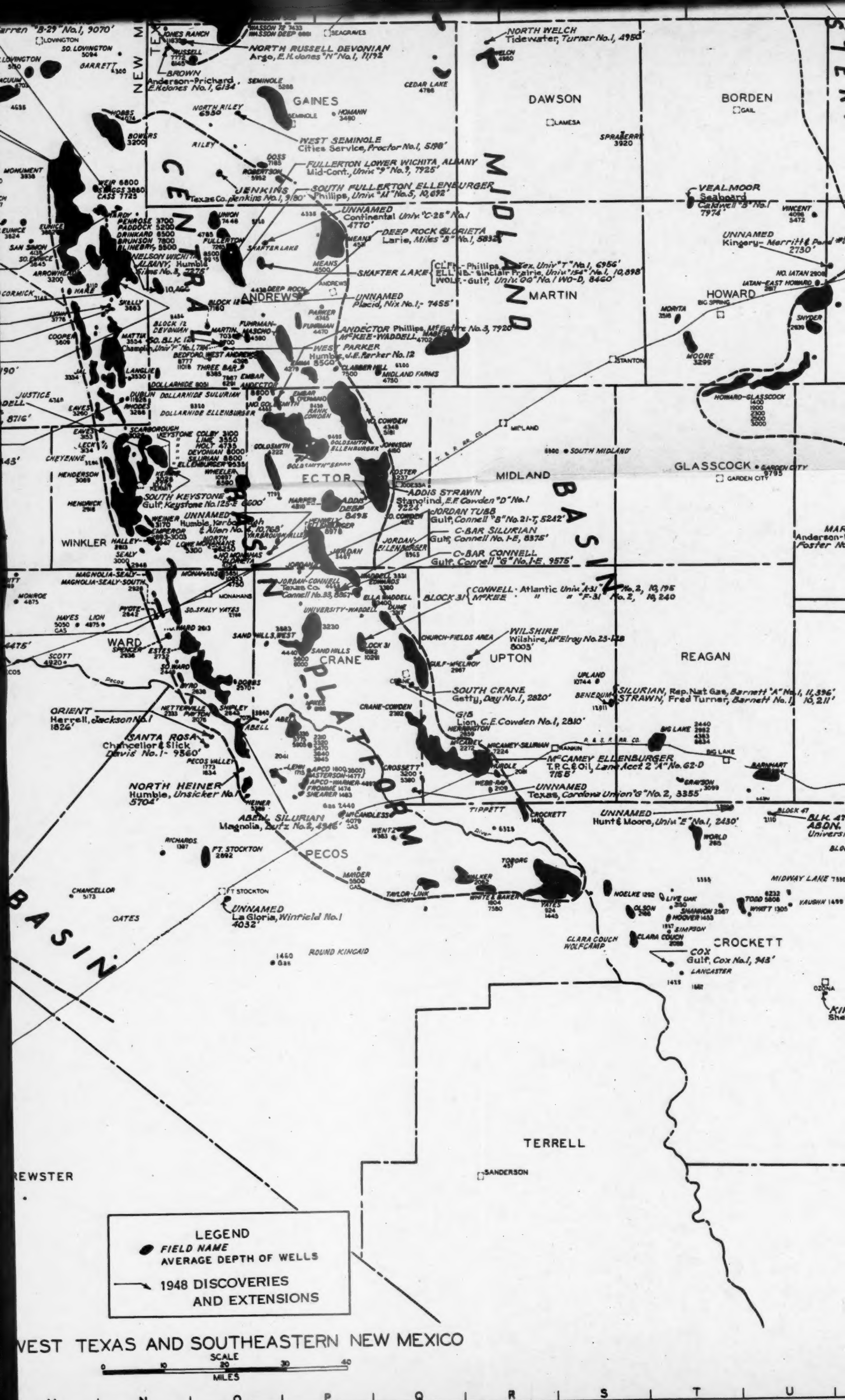
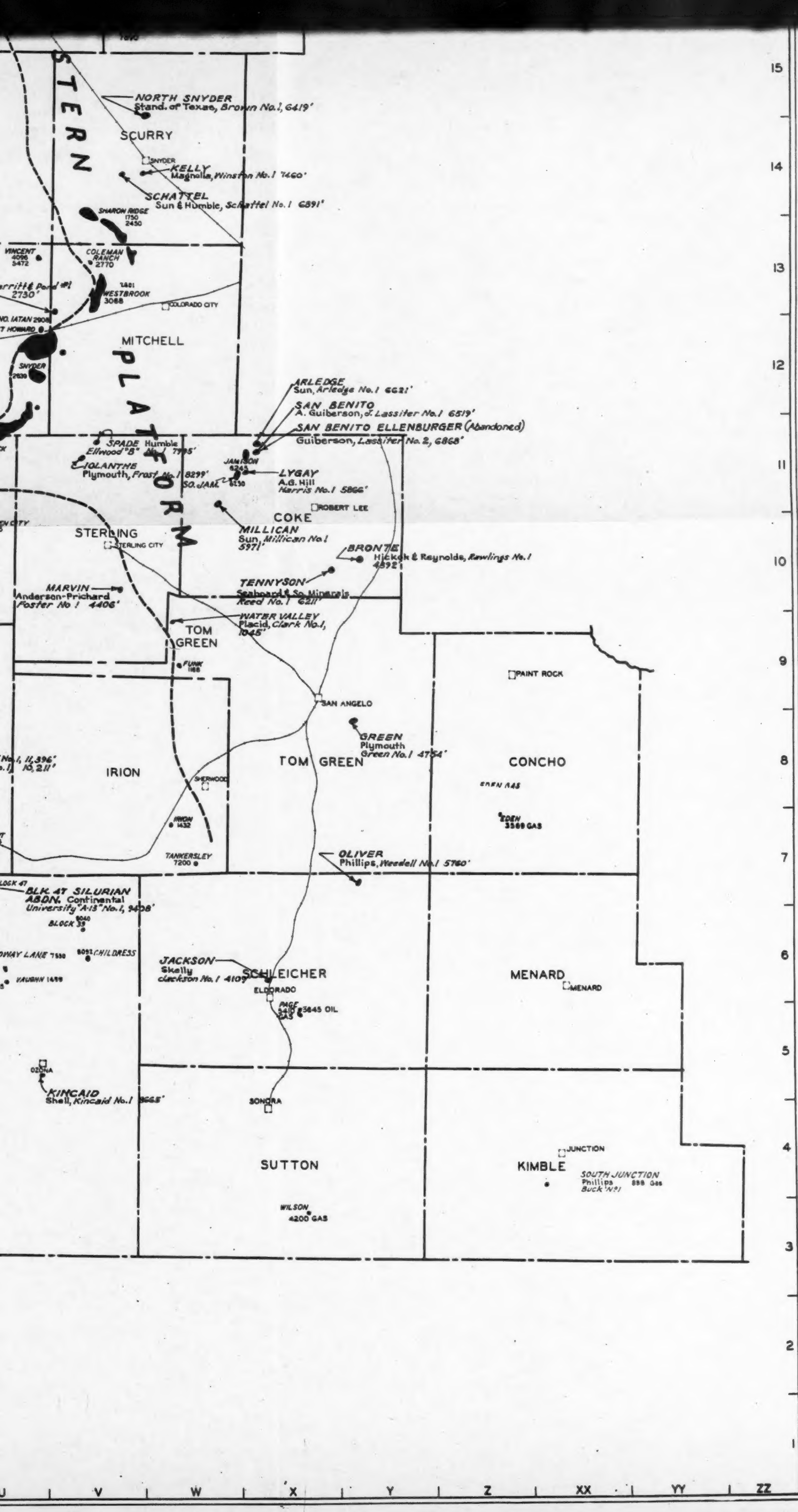

AS AND SOUTHEASTERN NEW MEXICO
LEGEND
FIELD NAME
AVERAGE DEPTH OF WELLS
1948 DISCOVERIES
AND EXTENSIONS
SCALE
MILES
GAINES
DAWSON
BORDEN
SCURRY
ANDREWS
MARTIN
HOWARD
MITCHELL
ECTOR
MIDLAND
GLASSCOCK
STERLING
CRANE
UPTON
REAGAN
IRION
PECOS
CROCKETT
TERRELL
MIDLAND BASIN
CENTRAL BASIN PLATFORM
NORTH WELCH
Tidewater, Turner No. 1, 4950'
NORTH RUSSELL DEVONIAN
Argo, E.H. Jones "N" No. 1, 11,192
WEST SEMINOLE
Cities Service, Proctor No. 1, 5198'
FULLERTON LOWER WICHITA ALBANY
Mid-Cont., Univ. "9" No. 9, 7925'
SOUTH FULLERTON ELLENBURGER
Phillips, Univ. "M" No. 5, 10,692'
VEALMOOR
Seaboard
Caldwell "3" No. 1
7974'
UNNAMED
Kingery-Merritt & Pond #1
2730'
UNNAMED
Continental Univ. "C-25" No. 1
4770'
DEEP ROCK GLORIETA
Larie, Miles "8" No. 1, 5832'
SHAFTER LAKE
UNNAMED
Placid, Nix No. 1 - 7455'
LANDECTOR Phillips, McEntire No. 3, 7920
McKEE-WADDELL
WEST PARKER
Humble, J.E. Parker No. 12
SPADE Humble
IOLANTHE
Plymouth, Frost No. 1
ADDIS STRAWN
Stanolind, E.F. Cowden "D" No. 1
7224'
JORDAN TUBB
Gulf, Connell "8" No. 21-T, 5242'
C-BAR SILURIAN
Gulf, Connell No. 1-E, 8375'
C-BAR CONNELL
Gulf, Connell "6" No. 1-E, 9575'
MARVIN
Anderson-Prichard
Foster No. 1 4406'
SOUTH KEYSTONE
Gulf, Keystone No. 125-E 6600'
UNNAMED
Humble, Yarbrough & Allen No. 1, 10,768'
BLOCK 31
CONNELL - Atlantic Univ. "A-31" No. 2, 10,196
McKEE " " "F-31" No. 2, 10,240
WILSHIRE
Wilshire, McElroy No. 23-128
8005'
SOUTH CRANE
Getty, Day No. 1, 2820'
SILURIAN, Rep. Nat Gas, Barnett "A" No. 1, 11,396'
STRAWN, Fred Turner, Barnett No. 1 10,211'
McCAMEY ELLENBURGER
T.P.C. & Oil, Land Acct. 2 "A" No. 62-D
7155'
UNNAMED
Texas, Cordona Union "G" No. 2, 3385'
NORTH HEINER
Humble, Unsicker No. 1
5704'
ABELL SILURIAN
Magnolia, Butz No. 2, 4946'
UNNAMED
Hunt & Moore, Univ. "E" No. 1, 2430'
BLK. 47 SILURIAN
ABDN. Continental
University "A-13" No. 1, 9408'
UNNAMED
La Gloria, Winfield No. 1
4032'
COX
Gulf, Cox No. 1, 948'
KINCAID
Shell, Kincaid No. 1 9665'
N O P Q R S T U V

FIG. 1



WEST TEXAS AND SOUTHEASTERN NEW MEXICO
LEGEND
FIELD NAME
AVERAGE DEPTH OF WELLS
1948 DISCOVERIES AND EXTENSIONS
SCALE
MILES
0 10 20 30 40
M N O P Q R S T U
GAINES
DAWSON
BORDEN
ANDREWS
MARTIN
HOWARD
MIDLAND
GLASSCOCK
ECTOR
WINKLER
WARD
CRANE
UPTON
REAGAN
PECOS
CROCKETT
TERRELL
BREWSTER
CENTRAL BASIN PLATFORM
MIDLAND BASIN
NORTH WELCH
Tidewater, Turner No.1, 4950'
NORTH RUSSELL DEVONIAN
Argo, E.H.Jones "N" No.1, 11,192
WEST SEMINOLE
Cities Service, Proctor No.1, 5198'
FULLERTON LOWER WICHITA ALBANY
Mid-Cont., Univ. "9" No.9, 7925'
SOUTH FULLERTON ELLENBURGER
Phillips, Univ. "M" No.5, 10,692'
JENKINS
Texas Co. Jenkins No.1, 9180'
VEALMOOR
Seaboard
UNNAMED
Continental Univ. "C-25" No.1
4770'
DEEP ROCK GLORIETA
Larie, Miles "B" No.1, 5832'
SKAFTER LAKE
UNNAMED
Placid, Nix No.1, 7455'
ANDECTOR
WEST PARKER
Humble, J.E.Parker No.12
ADDIS STRAWN
Stanolind, E.F.Cowden "D" No.1
7224
JORDAN TUBB
Gulf, Connell "B" No.21-T, 5242'
C-BAR SILURIAN
Gulf, Connell No.1-E, 8375'
C-BAR CONNELL
Gulf, Connell "G" No.1-E, 9575'
SOUTH KEYSTONE
Gulf, Keystone No.125-E
WILSHIRE
Wilshire, McElroy No.23-128
8003'
SOUTH CRANE
Getty, Day No.1, 2820'
Lion, C.E.Cowden No.1, 2810'
McCAMEY ELLENBURGER
UNNAMED
Texas, Cordona Union "G" No.2, 3355'
UNNAMED
Hunt & Moore, Univ. "E" No.1, 2430'
ORIENT
Harrell, Jackson No.1
1826'
SANTA ROSA
Chancellor & Slick
Davis No.1- 9360'
NORTH HEINER
Humble, Unsicker No.1
5704'
ABELL SILURIAN
Magnolia, Lutz No.2, 4946'
UNNAMED
La Gloria, Winfield No.1
4032'
COX
Gulf, Cox No.1, 943'
CLARA COUCH WOLFCAMP
MIDWAY LANE
BASIN

Fig. 1



NORTH SNYDER
Stand. of Texas, Brown No. 1, 6419'
SCURRY
SNYDER
KELLY
Magnolia, Winston No. 1 7460'
SCHATTEL
Sun & Humble, Schattel No. 1 6891'
SHARON RIDGE
1750
2450
VINCENT
4096
3472
COLEMAN RANCH
2770
Merritt & Pond #1
2730'
WESTBROOK
3068
COLORADO CITY
MITCHELL
SNYDER
2630
STERN
PLATFORM
ARLEDGE
Sun, Arledge No. 1 6621'
SAN BENITO
A. Guiberson, J. Lassiter No. 1 6519'
SAN BENITO ELLENBURGER (Abandoned)
Guiberson, Lassiter No. 2, 6868'
SPADE Humble
Ellwood "B" No. 1 7795'
IOLANTHE
Plymouth, Frost No. 1 8299'
SO. JAM.
JAMESON
LYGAY
A.G. Hill
Harris No. 1 5866'
ROBERT LEE
COKE
MILLICAN
Sun, Millican No. 1
5971'
STERLING
STERLING CITY
BRONTE
Hickok & Reynolds, Rawlings No. 1
4892'
MARVIN
Anderson-Prichard
Foster No. 1 4406'
TENNYSON
Seaboard & So. Minerals
Reed No. 1 6211'
WATER VALLEY
Placid, Clark No. 1,
1045'
TOM GREEN
FUNK
1188
PAINT ROCK
SAN ANGELO
GREEN
Plymouth
Green No. 1 4754'
TOM GREEN
CONCHO
IRION
SHERWOOD
EDEN GAS
EDEN
3369 GAS
IRION
1432
TANKERSLEY
7200
OLIVER
Phillips, Weddell No. 1 5760'
BLK. 47 SILURIAN
ABDN. Continental
University "A-13" No. 1, 9408'
BLOCK 39
CHILDRESS
JACKSON
Skelly
Jackson No. 1 4109'
SCHLEICHER
ELDORADO
PAGE
3645 OIL
GAS
MENARD
MENARD
VAUGHN 1459
OZONA
KINCAID
Shell, Kincaid No. 1 8665'
SONORA
JUNCTION
SUTTON
KIMBLE
SOUTH JUNCTION
Phillips
Buck No. 1
898 Gas
WILSON
4200 GAS
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
U
V
W
X
Y
Z
XX
YY
ZZ


CARY
TEAGUE

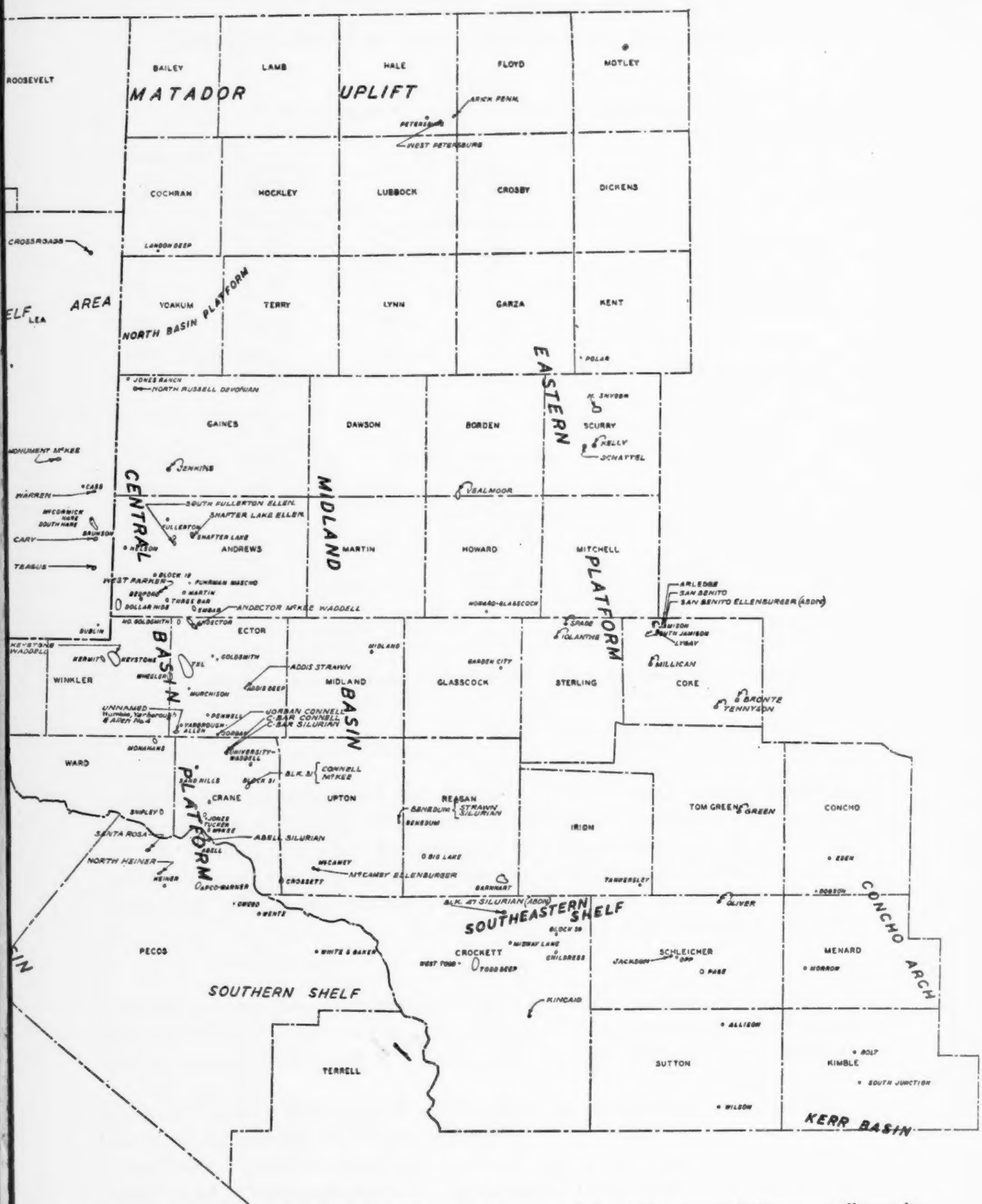


Fig. 2.—Pre-Permian fields and pools of West Texas and Southeast New Mexico. Arrows indicate 1948 discoveries.

TABLE I
EXPLORATORY AND DEVELOPMENT DRILLING IN 1948

		West Texas		Southeast New Mexico	
		Producing	*Dry*	*Producing*	*Dry*
		EXPLORATORY TESTS			
New-field wildcats		46	199	10	53
New-pool wildcats		20	22	4	3
Deeper-pool tests		4	11	3	3
Shallow-pool tests		5	—	—	—
Outposts		32	40	7	7
Totals		107	272	24	66
Exploratory producers	131				
Exploratory dry tests	338				
Total	469				
		DEVELOPMENT TESTS			
Established fields		2,626	167	395	50
New fields		94	27	9	2
Totals		2,720	194	404	52
Development producers	3,124				
Development dry tests	246				
Total	3,370				
Total tests in 1948	3,839				

Producers in West Texas and Southeast New Mexico, January 1, 1948	25,853
Producers drilled during 1948	3,255
Total producers, January 1, 1949	29,108

duced for the first time in Crane, Crockett, and Pecos counties, and a Silurian pool was discovered on the Benedum structure in Upton County. The C-Bar field in northern Crane County was discovered by the Gulf's Connell "E" No. 1. At this time it is impossible to say whether or not this is a major discovery. In Pecos County the Magnolia's Lutz No. 2 was the first Silurian producer in the Abell multi-pay field, and in Pecos County.

ORDOVICIAN

For the first time anywhere in this area, oil was produced from the Montoya formation of Ordovician age. The discovery well of the Cary field was the Rowan Drilling Company's Cary No. 5 in Sec. 22, T. 22 S., R. 37 E., Lea County, New Mexico.

Of the nine discoveries from sands of the Simpson group, seven were new pools in established fields. These producing areas included the Block 31 and C-Bar fields of Crane County, the Andector and Jordan fields of Ector County, the Keystone field of Winkler County, and the Monument field of Lea County, New Mexico. The two new fields were both in Lea County, New Mexico. The

TABLE II
GEOPHYSICAL ACTIVITY BY COUNTIES*
(Crew Weeks)

County	*Seismograph*	*Gravimeter*	*Magnetometer*
WEST TEXAS			
Andrews	188	13	
Bailey	20	2	6
Borden	117	1	
Cochran	57	5	
Coke	112	59	
Crane	63		2
Crockett	210	48	2
Crosby	23	1	
Culberson	10		1
Dawson	75		
Dickens	10		
Ector	69	23	8
Edwards	2		
Floyd	26		
Gaines	132		3
Garza	33		
Glasscock	44	18	
Hale	12	3	13
Hockley	32	1	
Howard	42	13	
Hudspeth	3		
Irion	77	11	
Lamb	26	7	6
Loving			4
Lubbock	71		
Lynn	62		
Martin	135		
Midland	71		
Mitchell	77	30	
Pecos	12	19	
Reagan	231	4	5
Schleicher	44	27	
Scurry	102	27	
Sterling	48	27	
Sutton	32	22	
Terrell	1	15	
Terry	125		
Tom Green	106	46	
Upton	215	1	1
Val Verde	11		
Ward	55	3	3
Winkler	97	5	3
Yoakum	38		
Totals	2,916	431	57
SOUTHEAST NEW MEXICO			
Chaves	126	15	21
Curry	6		1
De Baca		5	22
Eddy	28	26	15
Lea	433	102	17
Otero	5	1	
Roosevelt	98	34	5
Totals	696	183	81
Totals for area	3,612	614	138

* Data compiled from those presented in the weekly meetings of the Land and Geophysical Check held by the West Texas and Southeast New Mexico Oil Scouts associations. Only information on the three major instruments was regularly available.

Teague field was discovered by the Gulf's La Munyon No. 6 in Sec. 28, T. 23 S., R. 37 E., and the Warren field was discovered by the Continental's Warren "B-29" No. 1 in Sec. 29., T. 20 S., R. 38 E.

There were eight Ellenburger discoveries in the area during 1948. Four of these were new pools: South Fullerton and Shafter Lake in Andrews County; San Benito, since abandoned, in Coke County; and McCamey in Upton County. The four new fields are Tennyson in Coke County, Kincaid in Crockett, Santa Rosa in Pecos, and Spade in Sterling County. None of the discoveries appears to be of major importance.

DRY TESTS

Since in nearly every case the important dry wildcats are those which penetrated the full sedimentary column, it seems appropriate to discuss them here. For the purpose of this discussion only those dry wildcats are considered important which supplied information concerning the geologic column in areas of little or no control. No tables concerning dry tests are included in this paper because of limitations of space.

On the Southeastern shelf and in the southern part of the Midland basin in Irion, Reagan, Upton, and northern Crockett counties, almost a dozen Ellenburger tests were drilled, which although dry, contributed much toward clearing the obscure paleogeologic pattern.

Several interesting deep tests were being drilled at the close of the year in the Midland basin and at least three have shown for new field pre-Permian discoveries in 1949.

On the Eastern platform, 23 dry Ellenburger wildcats were drilled which contributed materially to the structural and geological knowledge of this important area. The Ellenburger, to date, has still not been proved to be a very satisfactory producing formation in this part of the district.

In the Delaware basin, the Argo's Ikens No. 1, an outpost to the Verhalen-Wolfcamp field of southern Reeves County, was a disappointing dry hole to the Wolfcamp at 11,250 feet. The only other deep test in the basin proper was the Gulf and Grisham and Hunter's Grisham-Hunter "F" No. 1 which tested the Ellenburger to the total depth of 12,103 feet, and supplied needed information concerning the geologic section of this deep basin. The Amerada's Record No. 2 in the extreme northeastern part of the Delaware basin, and near the edge of the Central Basin platform in Sec. 25, T. 19 S., R. 35 E., was dry in the Devonian at 13,524 feet.

Undoubtedly the wildest wildcat drilled this year was the W. W. West's Presidio Trust No. 1 in Sec. 1, Block 1, D&P Survey, Presidio County, Texas, to the total depth of 8,002 feet in questionable Permian. This well, at the south end of the Marfa basin in southern Presidio County, was more than 125 air line miles from the nearest commercial production in West Texas.

On the Northwestern shelf in northern Lea, southern Roosevelt, northern Eddy, and Chaves counties, New Mexico, ten tests were drilled to the pre-Cam-

TABLE III

NEW FIELDS AND POOLS DISCOVERED IN 1948

COUNTY	FIELD	PRODUCING UNITS	GEOLOGIC SYSTEM	DISCOVERY DATE	DEPTH TO PAY	TOTAL PRODUCERS 1-1-49	DRY HOLES 1948	METHOD OF DISCOVERY	DEEPEST FORMATION AND TOTAL DEPTH	POTENTIAL
Texas Andrews	Block 12, South	Clear Fork	Permian	Dec.	7104	1		Sub. Surf.	Devonian 8700	P. 80 BO plus 55% W 24 hrs.
Andrews	Deep Rock Glorieta	Glorieta	Permian	Dec.	5715	1		Sub. Surf.	Clear Fork 7520	P. 130 BO plus 30% W 24 hrs.
Andrews	Fullerton Ellenburger South	Ellenburger	Ordovician	March	10,200	6		Sub. Surf. & Seis.	Ellenburger 11,169	F. 740 BOPD
Andrews	Fullerton, Lower Wichita Albany	Wichita	Permian	July	7890	2		Sub. Surf.	Ellenburger 11,169	F. 482 BOPD
Andrews	Nelson Wichita Albany	Wichita	Permian	Dec.	7160	1		Sub. Surf.	Pre-Cam. 10,606	P. 42 BO plus 7 BW 24 hrs.
Andrews	Parker, West	Devonian	Devonian	June	8390	3		Sub. Surf. & Seis.	Ellenburger 10,398	F. 636 BO plus 57 BW 24 hrs.
Andrews	Shafter Lake Clear Fork	Clear Fork	Permian	June	6910	1		Sub. Surf. & Trend	Ellenburger 11,898	P. 26 BO plus 7 BW 24 hrs.
Andrews	Shafter Lake Ellenburger	Ellenburger	Ordovician	Dec.	11,685	1		Sub. Surf. & Seis.	Ellenburger 11,898	F. 1139 BO 24 hrs.
Andrews	Shafter Lake Wolfcamp	Wolfcamp	Permian	March	8410	23		Sub. Surf. & Seis.	Ellenburger 11,898	F. 856 BOPD
Andrews	Unnamed, Placid #1 Nix	Clear Fork	Permian	Aug.	7360	1		Sub. Surf.	Clear Fork 7455	P 85 BO plus 50% W 24 hrs.
Andrews	Unnamed, Continental University "C-25" #1	San Andres	Permian	June	4725			Non-tech.	San Andres 4770	P. 5 BO plus 8% W 24 hrs. P&A after Official Completion
Cochran	Maston-Atlantic, (Prorated with Slaughter)	San Andres	Permian	Jan.	4940	Combined with Slaughter		Sub. Surf.	San Andres 5050	P. 42 BO plus 24 BW 24 hrs.
Cochran	Maston-Seaboard. (Prorated with Slaughter)	San Andres	Permian	June	4967	Combined with Slaughter		Sub. Surf.	San Andres 5133	P. 185 BO 24 hrs.
Cochran	Veal, (Prorated with Levelland)	San Andres	Permian	March	4920	Combined with Levelland		Sub. Surf.	San Andres 4980	F. 362 BOPD
Coke	Arledge	Marble Falls	Pennsylvanian	Jan.	6600	2	1	Surf. & Seis.	Marble Falls 6221	P. 90 BO 24 hrs.
Coke	Bronte	Palo Pinto	Pennsylvanian	Aug.	4350	3		Seis. & Core Drill	Pre-Cam. 5502	F. 360 BOPD
Coke	Lygay	Strawn Sand	Pennsylvanian	Aug.	5800	4		Sub. Surf. & Trend	Ellenburger 7047	F. 171 BOPD
Coke	Millican	Strawn	Pennsylvanian	Nov.	5950	2		Surf. & Seis.	Strawn 5971	F. 474 BOPD
Coke	San Benito	Marble Falls	Pennsylvanian	June	6495	1		Trend	Ellenburger 6868	F. 294 BOPD
Coke	San Benito Ellenburger	Ellenburger	Ordovician	Oct.	6818	1	1	Sub. Surf.	Ellenburger 6868	F. 176 BOPD P & A after compl.
Coke	Tennyson	Ellenburger	Ordovician	May	6180	4	2	Seis.	Ellenburger 6219	F. 176 BOPD
Crane	Block 31 Connell	Connell (Simpson)	Ordovician	Aug.	10,170	2		Sub. Surf.	Pre-Cam. 11.645	F. 150 BO 24 hrs.
Crane	Block 31, McKee	McKee (Simpson)	Ordovician	Dec.	9641	1		Sub. Surf.	Pre-Cam. 11,645	F. 670 BO 24 hrs.
Crane	C-Bar Connell	Waddell (Simpson)	Ordovician	Aug.	9512	1		Sub. Surf.	Ellenburger 9940	F. 116 BO 24 hrs.
Crane	C-Bar Silurian	Fusselman	Silurian	Jan.	8355	2	1	Seis.	Ellenburger 9940	F. 1805 BOPD
Crane	Crape, South	Grayburg	Permian	June	2705	1	1	Sub. Surf.	Grayburg 3179	P. 72 BO 24 hrs.

NOTE.—Since completion of this article, the name Susan Peak has been applied to the field in Tom Green County. Texas, which appears in this table and in Figure 1 as Green field.

Texas Crane	Gib	Grayburg	Permian	Jan.	2755	6	1	Sub. Sur. & Seis.	Devonian 8578	P. 20 BO 24 hrs.
Crane	Unnamed, Texas Co. Cordova Union "G" #2	Clear Fork	Permian	Oct.	3310	1		Sub. Surf.	Simpson 5590	P. 188 BO 24 hrs.
Crockett	Block 47 Silurian	Fusselman	Silurian	Mar.	9210		2	Seis.	Ellenburger 10,232	P. 104 BOPD, P&A after Official Completion
Crockett	Cox	Queen	Permian	Jan.	894	2	3	Core Drill	Grayburg 1251	P. 152 BOPD
Crockett	Kincaid	Ellenburger	Ordovician	Sept.	8665	1		Seis.	Ellenburger 9091	F. 1067 MCF Gas PD
Crockett	Unnamed, Hunt & Moore University "E" #1	San Andres	Permian	Sept.	2365	1		Sub. Surf.	San Andres 2430	P. 8 BO 24 hrs.
Culberson	Rustler Hills	Rustler	Permian	Aug.	470	1	1	Sub. Surf.	Rustler 484	P. 21 BO 24 hrs.
Dawson	Welch, North	San Andres	Permian	Nov.	4880	1		Sub. Surf. & Seis.	San Andres 5061	P. 60 BO & 29 BW 24 hrs.
Ector	Addis Strawn	Strawn	Pennsylvanian	March	9205	1		Seis.	Ellenburger 13,620	F. 202 BO 24 hrs.
Ector	Andector McKee & Waddell	McKee & Waddell (Simpson)	Ordovician	Sept.	7635	2		Sub. Surf.	Pre-Cam. 8562	F. 120 BOPD
Ector	Jordan Connell	Connell (Simpson)	Ordovician	Sept.	8830	8		Sub. Surf. & Seis.	Ellenburger 9964	F. 589 BOPD
Ector	Jordan Tubb	Clear Fork	Permian	March	5242	8	3	Sub. Surf. & Seis.	Ellenburger 9964	F. 817 BOPD
Ector	Penwell 4500	Clear Fork	Permian	Sept.	4410	1		Sub. Surf.	Ellenburger 9101	F. 39 BO & 7 BW 24 hrs.
Ector	Unnamed, Humble, Yarborough & Allen #4	Ellenburger	Ordovician	Aug.	10,595	1		Seis.	Ellenburger 10,800	P. 117 B Fluid cut 17% W 24 hrs.
Floyd	Arick Wolfcamp	Wolfcamp	Permian	Dec.	4798	1		Sub. Surf.	Pre-Cam. 7757	F. 733 BOPD
Floyd & Hale	Arick Pennsylvanian	Pennsylvanian	Pennsylvanian	April	5820	3		Work Over of P&A Dry Hole	Pre-Cam. 7757	P. 118 plus 52% W PD
Gaines	Brown	Clear Fork	Permian	May	6030	4		Sub. Surf. & Seis.	Wichita 7850	P. 195 BO plus 27 BW PD
Gaines	Jenkins	Devonian	Devonian	Aug.	9100	1		Seis.	Pre-Cam. 11,705	F. 175 BO plus 43 BW PD
Gaines	Russell, North Devonian	Devonian	Devonian	Nov.	11,125	1		Sub. Surf. & Seis.	Devonian 11,205	Swab 690 BO 24 hrs.
Gaines	Seminole, West	San Andres	Permian	July	5042	4		Seis.	Clear Fork 7660	F. 411 BOPD
Hale	Petersburg, West	Pennsylvanian	Pennsylvanian	Feb.	7908	1		Seis.	Pennsylvanian 7985	F. 162 BO 24 hrs.
Hockley	Smyer, West	Clear Fork	Permian	June	5855	8		Seis.	Clear Fork 6015	Swab 236 BO 24 hrs.
Hockley	Yellowhouse, North	San Andres	Permian	Dec.	4617	1		Seis.	San Andres 4648	P. 94 BO plus 12% W 24 hrs.
Howard	Vealmoor	Pennsylvanian	Pennsylvanian	April	7751	6	1	Seis.	Ellenburger 10,157	F. 200 BO plus 40 BW 24 hrs.
Mitchell	Unnamed, Kingery Bros., Merrett & Pond #1	Clear Fork	Permian	Oct.	2461	1		Sub. Surf.	Clear Fork 2829	P. 21 BO plus 10% W 24 hrs.
Pecos	Abell Silurian	Fusselman	Silurian	Aug.	4936	2		Sub. Surf.	Pre-Cam. 5745	F. 163 BO 24 hrs.
Pecos	Heiner, North	Fusselman	Silurian	Aug.	5630	1		Sub. Surf.	Ellenburger 8460	P. 67 BO plus 17 BW 24 hrs.
Pecos	Orient	Yates	Permian	April	1800	7		Sub. Surf.	Yates 2826	F. 66 BOPD
Pecos	Santa Rosa	Ellenburger	Ordovician	April	9125	1		Sub. Surf.	Ellenburger 9795	F. 6400 MCF Gas plus 186 B Dist. 24 hrs.
Pecos	Unnamed, Winfield, La Gloria #1	San Andres	Permian	March	3955	1		Sub. Surf.	San Andres 4032	F. 1500 MCF Gas & 20 B Dist. PD
Reeves	Chapman	Delaware Mtn.	Permian	June	2900	1		Sub. Surf.	Delaware Mtn. 2906	P. 107 BO 12 hrs.
Reeves	Dixieland	Delaware Mtn.	Permian	April	3835	3	1	Sub. Surf.	Delaware Mtn. 3939	F. 73 BOPD
Schleicher	Jackson	Cisco	Pennsylvanian	Dec.	4072	1		Sub. Surf.	Pennsylvanian 4109	F. 104 BO 12 hrs.
Schleicher	Oliver	Strawn	Pennsylvanian	June	5630	1		Sub. Surf. & Seis.	Pennsylvanian 6150	P. 35 BO 24 hrs.
Scurry	Snyder, North	Canyon	Pennsylvanian	Nov.	6260	1		Seis.	Pennsylvanian 6419	F. 532 BO 24 hrs.

Texas										
Scurry	Kelly	Caddo	Pennsylvanian	Nov.	7429	1		Sub. Surf.	Ellenburger 7905	P. 67 BO plus 24 BW 24 hrs.
Scurry	Schattell	Cisco	Pennsylvanian	July	6816	1	2	Sub. Surf.	Ellenburger 8110	F. 480 BOPD
Sterling	Iolanthe	Strawn	Pennsylvanian	July	8200	1	1	Seis.	Ellenburger 8444	P. 8 BO plus 88% W 24 hrs.
Sterling	Garvin	Wichita	Permian	April	4250	3	5	Sub. Surf. & Seis.	Ellenburger 8230	F. 849 BOPD
Sterling	Spade	Ellenburger	Ordovician	May	7970	1	1	Sub. Surf. & Seis.	Ellenburger 8000	F. 113 BO 24 hrs.
Tom Green	Green	Strawn	Pennsylvanian	Dec.	4724	1		Seis.	Pennsylvanian 4754	F. 362 BOPD
Tom Green	Water Valley	San Andres	Permian	Nov.	1035	1		Sub. Surf. & Seis.	Ellenburger 7838	P. 47 BO 24 hrs.
Upton	Benedum Silurian	Fusselman	Silurian	Oct.	11,242	1		Sub. Surf.	Pre-Cam. 12,505	F. 457 BOPD
Upton	Benedum Strawn	Strawn	Pennsylvanian	Sept.	9980	1		Sub. Surf.	Pre-Cam. 12,505	F. 747 BOPD
Upton	McCamey Ellenburger	Ellenburger	Ordovician	May	8070	1		Sub. Surf.	Ellenburger 8215	F. 54 BO plus 68% W PD
Upton	Wilshire	Wolfcamp	Permian	Dec.	7740	1		Sub. Surf.	Ellenburger 13,977	P. 227 BOPD
Winkler	Keystone, South	Clear Fork	Permian	July	6470	2		Seis.	Ellenburger 11,502	F. 162 BOPD
Winkler	Keystone Waddell	Waddell (Simpson)	Ordovician	Feb.	8691	5		Sub. Surf.	Pre-Cam. 10,756	F. 2200 MCF Gas PD
Yoakum	Unnamed, Magnolia, Brown #1	San Andres	Permian	Dec.	5173	1		Sub. Surf.	San Andres 5223	P. 16 BO plus 3 BW 9 hrs.
New Mexico										
Eddy	Nichols	San Andres	Permian	July	2919	4	1	Sub. Surf.	San Andres	F. 100 BOPD
Lea	Cary	Montoya	Ordovician	June	7140	1	1	Sub. Surf.	Ellenburger 8086	F. 213 BOPD
Lea	Crossroads	Devonian	Devonian	May	12,106	1		Sub. Surf. & Seis.	Devonian 12,258	F. 3744 BOPD
Lea	Crossroads Slaughter	San Andres	Permian	Feb.	4863	1		Sub. Surf. & Seis.	Devonian 12,258	P. 3 BO & 40 BWPD
Lea	Drinkard, North	Drinkard (Yeso)	Permian	March	6625	1		Sub. Surf.	Pre-Cambrian 8590	F. 12,000 MCF PD
Lea	Grayburg Keely	San Andres	Permian	March	3296	1		Sub. Surf.	San Andres 3407	F. 99 BOPD
Lea	Leonard	Queen	Permian	June	3400	2		Sub. Surf.	Queen 3511	F. 80 BOPD
Lea	Monument Blinebry	Yeso	Permian	May	5700	2		Sub. Surf.	Pre-Cambrian 9953	F. 163 BOPD
Lea	Monument McKee	McKee(Simpson)	Ordovician	Dec.	9890	1		Sub. Surf.	Pre-Cambrian 10,255	F. 111 BOPD, 9% Wtr.
Lea	Monument Paddock	Yeso	Permian	Jan.	5180	3		Sub. Surf.	Pre-Cambrian 9953	F. 840 BOPD
Lea	Monument Abo	Abo	Permian	Sept.	7160	1		Sub. Surf.	Pre-Cambrian 9822	F. 43 BOPD
Lea	South Drinkard	Drinkard (Yeso)	Permian	Aug.	6406	1		Sub. Surf. & Seis.	Ellenburger 10,204	F. 126 BOPD
Lea	Teague	McKee(Simpson)	Ordovician	March	9340	3		Sub. Surf. & Seis.	Pre-Cambrian 10,218	F. 900 BOPD
Lea	Warren	McKee(Simpson)	Ordovician	Dec.	8965	1		Sub. Surf. & Seis.	Simpson 9070	F. 3528 BOPD
Lea	Watkins Grayburg	Seven Rivers	Permian	Jan.	4180	2		Sub. Surf.	Grayburg 4252	P. 49 BOPD
Lea	Wilson, West	Seven Rivers	Permian	Nov.	3945	1		Sub.Surf.	Seven Rivers 3948	F. 218 BOPD
Lea	Unnamed, Gulf Elson 1	Seven Rivers	Permian	Nov.	3300	1		Sub. Surf.	Simpson 9685	F. 686 MCF PD

TABLE IV

SUCCESSFUL NEW-FIELD WILDCATS COMPLETED IN 1948

COUNTY	OPERATOR	FARM	LOCATION	TOTAL DEPTH (FEET) DRILLED	PRODUCING	INITIAL PRODUCTION BOPD	PRODUCING FORMATION OR SERIES	DISCOVERY METHOD	POOL—NEW OR EXTENDED
TEXAS									
Andrews	Continental	Univ."C-25" #1	Sec. 25, Blk. 14, U.L.	4770	4770	P. 5 BO + 80% wtr.	San Andres	Non-tech.	P&A after official completion
Andrews	Humble	J.E. Parker #12	Sec.2,Blk.A-54, PSL	10398	8560	F. 636 BO + 57 BW	Devonian	Sub. Surf. & Seis.	West Parker
Andrews	Placid Oil Co.	Nix #1	Sec.21, Blk.A-47, PSL	7455	7455	P. 85 BO + 50% W	Clear Fork	Sub. Surf.	Unnamed
Coke	A. Guiberson	J. Lassiter #1	Sec.308, Blk.1-A,H&TC	6538	6519	F. 294	Marble Falls	Surface, Sub. Surf. & Mag.	San Benito
Coke	Hickok & Reynolds	Rawlings #1	Sec.453, Blk.1-A,H&TC	5802	4392	F. 360	Palo Pinto	Seis. & Core Drill	Bronte
Coke	Seaboard & Southern Minerals	Reed #1	Sec. 1, HE&WT	6219	6211	F. 176	Ellenburger	Seis.	Tennyson
Coke	Sun	Arledge #1	Sec.261, Blk. 1-A, H&TC	6621	6621	P. 90	Marble Falls	Surface, Sub. Surf. & Seis.	Arledge
Coke	Sun	Millican #1	Sec. 230, Blk. 2, H&TC	5971	5971	F. 474	Strawn	Surface, Sub. Surf. & Seis.	Millican
Crane	Getty	Day #1	Sec. 3, Blk. X, CCSD&RGNG	3179	2820	P. 72	Grayburg	Sub. Surf.	South Crane
Crane	Gulf	Connell #1-E	Sec. 26, Blk. B-22, PSL	9915	8375	F. 1805	Fusselman	Seis.	C-Bar Silurian
Crane	Lion	C.E. Cowden #1	Sec. 14, Blk. X, CCSD&RGNG	8575	2810	P. 20	Grayburg	Sub. Surf. & Seis.	Cib
Crane	Texas Co.	Cordova Union "G" #2	Sec. 31, Blk. 35, H&TC	5590	3355	F. 188	Clear Fork	Sub. Surf.	Unnamed
Crockett	Continental	University "A-13" #1	Sec. 13, Blk. 47, University Lands	10232	9408	P. 104	Fusselman	Seis.	Block 47 Silurian P&A after official completion
Crockett	Gulf	Cox #1	S. Sloan #6, A-3389	1251	943	P. 152	Queen	Core Drill	Cox
Crockett	Hunt & Moore	Univsity "E" #1	Sec. 24, Blk. 12, University Lands	2430	2430	P. 8	San Andres	Sub. Surf.	Unnamed
Crockett	Shell	Kincaid #1	Sec. 6, Blk. MN, GC&SF	9091	8665	F. 1067 MCF Gas	Ellenburger	Seis.	Kincaid
Culberson	J. Mills	Fisher #1	Sec. 12, Blk. 110, PSL	484	484	P. 21	Rustler	Unknown	Rustler Hills
Dawson	Tidewater	Turner #1	Sec. 2, Blk. C-39, PSL	5061	4950	P. 60 + 29 W	San Andres	Sub. Surf. & Seis.	North Welch
Ector	Humble	Yarborough & Allen #4	Sec. 31, Blk. B-14 PSL	10800	10768	P. 117 + 17% W	Ellenburger	Seis.	Unnamed
Gaines	Anderson-Prichard	E. H. Jones #1	Sec. 21, Blk. A-7, PSL	7850	6134	P. 195 + 27 W	Clear Fork	Sub. Surf. & Seis.	Brown
Gaines	Argo	E. H. Jones "N" #1	Sec. 496, Blk. G, CCSD&RGNG	11205	11192	Swab 690	Devonian	Sub. Surf. & Seis.	North Russell Devonian
Gaines	Cities Service	Proctor #1	Sec. 335, Blk. G, CCSD&RGNG	5352	5198	F. 411	San Andres	Seis.	West Seminole
Gaines	Texas Co.	Jenkins #1	Sec. 4, Blk. A-25 PSL	11705	9180	F. 175 + 43 W	Devonian	Seis.	Jenkins
Hale	General American	Byrd #1	Sec. 17, Blk. K, TTRR	6767	5902	P. 118 + 52% W	Pennsylvanian	Work over of P&A Dry Hole	Arick
Hale	Humble	Lutrick #1	Sec. 17, Blk. D-8 EL&RR	7987	7987	F. 162	Pennsylvanian	Seis.	West Petersburg

TEXAS									
Howard	Seaboard	Caldwell "B" #1	Sec. 32, Blk. 32, T-3N, T&P	7974	7974	F. 200 ≠ 40 W	Canyon	Seis.	Vealmoor
Mitchell	Kingery Bros.	Merrett & Pond #1	Sec. 27, Blk. 29, T-1N, T&P	2829	2730	P. 21 ≠ 10% W	Clear Fork	Sub. Surf.	Unnamed
Pecos	Chancellor & Slick	Davis #1	Sec. 105, Blk. 8, H&GN	9796	9560	F. 6400 MCF Gas ≠ 186 B Dist.	Ellenburger	Sub. Surf.	Santa Rosa
Pecos	Herrell	Jackson #1	Sec. 102, Blk. 8, H&GN	1826	1826	F. 66	Yates	Sub. Surf.	Orient
Pecos	Humble	Unsicker #1	Sec. 5, Blk. 10, H&GN	8460	5704	P. 67 ≠ 17 W	Fusselman	Sub. Surf.	North Heiner
Pecos	La Gloria	Winfield #1	Sec. 10, Blk. 132, T&StL	4032	4032	F. 1500 MCF Gas & 20 B Dist.	San Andres	Sub. Surf.	Unnamed
Reeves	C & B Oil Co.	Anderson #1	Sec. 18, Blk. 2, H&GN	3939	3939	F. 73	Delaware Mtn.	Sub. Surf.	Dixieland
Reeves	Chapman	Randolph #1	Sec. 46, Blk. 57, T-2, T&P	2906	2906	P. 107 W in 12 hrs	Delaware Mtn.	Sub. Surf.	Chapman
Schleicher	Phillips	Weddell #1	Sec. 72, Blk. K, GH&SA	6150	5760	P. 35	Strawn	Sub. Surf. & Seis.	Cliver
Schleicher	Skelly	Jackson #1	Sec. 41, Blk. LL	4109	4109	F. 104 in 12 hrs.	Cisco	Sub. Surf.	Jackson
Scurry	Magnolia	Winston #1	Lot 72, Sec. 37, Blk. 1, K&F	7905	7460	P. 67 ≠ 24 W	Caddo	Sub. Surf.	Kelly
Scurry	Standard of Texas	Brown #1	Sec. 440, Blk. 97, H&TC	6419	6419	F. 532	Canyon	Seis.	North Snyder
Scurry	Sun & Humble	Schattel #1	Sec. 186, Blk. 97, H&TC	6891	6891	F. 480	Cisco	Sub. Surf.	Schattel
Sterling	Anderson-Prichard	Foster #1	Sec. 12, Blk. 15, H&TC	8230	4406	F. 849	Wichita	Sub. Surf. & Seis.	Marvin
Sterling	Humble	Ellwood "D" #1	Sec. 56, Blk. 18, SFRR	8000	7995	F. 113	Ellenburger	Sub. Surf. & Seis.	Spade
Sterling	Plymouth	Frost #1	Sec. 39, Blk. 2, H&TC	8444	8299	P. 8 ≠ 88% W	Strawn	Seis.	Iolanthe
Tom Green	Placid	Clark #1	Sec. 2, R.R. Wade	7838	1045	P. 43	San Andres	Sub. Surf. & Seis.	Water Valley
Tom Green	Plymouth	Green #1	Sec. 193, Dist. 11, SFRR	4754	4754	F. 362	Strawn	Seis.	Green
Upton.	Wilshire	McElroy #23-148	Sec. 148, Blk. E, CCSD&RGNG	13977	8003	P. 227	Wolfcamp	Sub. Surf.	Wilshire
Winkler	Gulf	Keystone #125-E	Sec. 29, Blk. B-2 PSL	11502	6600	F. 162	Clear Fork	Seis.	South Keystone
Yoakum	Magnolia	Brown #1	Sec. 446, Blk. D, J. H. Gibson	5323	5323	P. 16 ≠ 3 W in 9 hrs	San Andres	Sub. Surf.	Unnamed
			NEW-POOL WILDCATS						
Andrews	Champlin	University "F" #1	Sec. 34, Blk. 12, University Lands	8700	7104	P. 80 ≠ 55% W	Clear Fork	—	South Block 12
Andrews	Gulf	Univ. "QQ" #1 WO-D	Sec. 24, Blk. 13, University Lands	9774	8460	F. 856	Wolfcamp	—	Shafter Lake Wolfcamp
Andrews	Humble	Sims #3	Sec. 26, Blk. A-39, PSL	10685	7275	P. 42 ≠ 7 W	Wichita	—	Nelson Wichita Albany
Andrews	Mario	Miles "B" #1	Sec. 12, Blk. A-46, PSL	7520	5832	P. 130 ≠ 30% W	Glorieta	—	Deep Rock Glorieta
Andrews	Phillips	Texas Univ. "T" #1	Sec. 36, Blk. 13, University Lands	11000	6956	P. 26 ≠ 7 W	Clear Fork	—	Shafter Lake Clearfork
Cochran	Anderson-Prichard	Veal #1	Tr. 8, Lge. 118, Potter CSL	5038	4995	F. 362	San Andres	—	Prorated with Levelland
Cochran	Atlantic	Maston #1	Lab. 15, Lge. 132 Potter CSL	5050	5050	P. 42 ≠ 24 W	San Andres	—	Prorated with Slaughter
Cochran	Seaboard	Maston #1	Lab. 18, Lge. 154, Randall CSL	5133	5001	P. 185	San Andres	—	Prorated with Slaughter

TEXAS

Coke	A. G. Hill	Harris #1	Sec. 522, V. Homann	7047	5866	F. 171	Strawn Sand	—	Lygay
Crane	Atlantic	University "A-31" #2	Sec. 33, Blk. 31, University Lands	11645	10195	F. 150	Connell (Simpson)	—	Block 31 Connell
Crane	Gulf	Connell "G" #1-E	Sec. 27, Blk. B-22, PSL	9940	9575	F. 116	Connell (Simpson)	—	C-Bar Connell
Ector	Stanolind	E. F. Cowden "D" #1	Sec. 40, Blk. 43, T-2S, T&P	9235	9224	F.202	Strawn	—	Addis Strawn
Ector	Texas Co.	Connell #33	Sec. 1, Blk. B-22, PSL	8930	8867	F. 589	Connell (Simpson)	—	Jordan Connell
Ector	Texas Co.	Connell #34	Sec. 2, Blk. B-16, PSL	9101	4475	F. 39 & 7 W	Clear Fork	—	Penwell 4500
Floyd	General American	Carmichael #2	Sec. 18, Blk. K, TTRR	5910	4810	F. 733	Wolfcamp	—	Arick Wolfcamp
Hockley	Honolulu	Ellwood #1-A-13	Sec. 13, Blk. A, R.M. Thompson	6014	6014	Swab. 236	Clear Fork	—	West Smyer
Hockley	E. C. Larson	White #1	Lab. 16, Lge. 704, State Capitol Lds.	4648	4648	P. 94 + 12% W	San Andres	—	North Yellowhouse
Pecos	Magnolia	Lutz #2	Sec. 27, Lot 5, Blk. 9, H&GN	4946	4946	F. 163	Fusselman	—	Abell Silurian
Upton	Republic Nat. Gas	Barnett "A" #1	Sec. 40, Blk. Y, TCRR	12036	11396	F. 457	Fusselman	—	Benedum Silurian
Upton	Fred Turner	Barnett #1	Sec. 4, Blk. Y, GC&SF	12367	10211	F. 747	Strawn	—	Benedum Strawn

DEEPER-POOL TESTS

Andrews	Phillips	University "H" #5	Sec. 31, Blk. 13, University Lands	10828	10692	F. 740	Ellenburger	—	Fullerton South Ellenburger
Andrews	Sinclair-Prairie	University "154" #1	Sec. 2, Blk. 13, University Lands	10898	10898	F. 1139	Ellenburger	—	Shafter Lake Ellenburger
Coke	Guiberson	Lassiter #2	Sec. 308, Blk. 1-A, H&TC	6868	6868	F. 176 P & A after compl.	Ellenburger	—	San Benito Ellenburger
Upton	T-P Coal & Oil Co.	Lane Acct. 2 "A" #62-D	Sec. 5, GC&SF	7215	7155	F. 54 + 68% W	Ellenburger	—	McCamey Ellenburger

SHALLOW-POOL TESTS

Andrews	Mid-Continent	University "9" #9	Sec. 19, Blk. 13, University Lands	7955	7925	F. 482	Wichita	—	Fullerton Lower Wichita Albany
Crane	Atlantic	University "F-31" #2	Sec. 34, Blk. 31, University Lands	10299	10240	F. 671	McKee (Simpson)	—	Block 31 McKee
Ector	Gulf	Connell "B" #21-T	Sec. 26, Blk. B-16, PSL	5270	5242	F. 817	Clear Fork	—	Jordan Tubb
Ector	Phillips	McEntire #3	Sec. 18, Blk. 44, T-1N, T&P	7963	7920	F. 58 F. 120	McKee (Simpson) Waddell (Simpson)	—	Andector McKee & Waddell
Winkler	Richardson & Bass	Walton "W" #58	Sec. 1, Blk. B-3, PSL	8716	8716	F. 2200 MCF Gas	Waddell(Simpson)	-	Keystone Waddell

OUTPOSTS (SUCCESSFUL)

Andrews	Champlin	University "C" #1	Sec. 4, Blk. 11, University Lands	8426	8338	F. 111 + 3% W	Devonian	—	Three Bar
Andrews	Cities Service	University "T" #1	Sec. 13, Blk. 13, University Lands	9953	9953	F. 2378 F. 2115	Wolfcamp Devonian	—	Shafter Lake Wolfcamp & Devonian
Andrews	Humble	Parker #22	Sec. 2, Blk. A-54, PSL	8557	8330	F. 254	Devonian	—	West Parker
Andrews	Phillips	University "T" #2	Sec. 36, Blk. 13, University Lands	9900	9890	F. 861	Devonian	—	Shafter Lake Devonian
Andrews	Stanolind	F. Cowden #1	Sec. 3, Blk. 43, T-1N, T&P	5183	5183	F. 311	Holt	—	North Cowden Deep
Andrews	Stanolind	Lotus "F" #1	Sec. 18, Blk. A-48, PSL	7021	6970	P. 21 & 97 BW	Clear Fork	—	Fullerton
Andrews	Superior	Block "11-A #6	Sec. 4, Blk. 11, University Lands	8216	8216	F. 409	Devonian	—	Three Bar
Crane	Standard of Texas	Reynolds #1	Sec. 22, Blk. 3, H&TC	5869	5869	F. 880	Waddell(Simpson)	-	Tucker
Crane	Gulf	Waddell #111-E	Sec. 22, Blk. B-25, PSL	10911	10911	F. 867	Ellenburger	—	University Waddell Ellenburger
Crockett	C. W. Brown	Hoover "F" #1	Sec. 6, Blk. 1, GC&SF	2050	2050	P. 22	San Andres	—	Shannon
Crockett	Plymouth	Schlomach "O" #1	Sec. 9, Blk. GG, T&NO	6023	2000	P. 6	San Andres	—	Clara Couch
Ector	Gulf	Connell "B" #20-E	Sec. 26, Blk. B-16, PSL	8846	8846	F. 839	Ellenburger	—	Jordan Ellenburger
Ector	Amerada	Connell #1	Sec. 12, Blk. B-16, PSL	8935	8935	F. 328	Ellenburger	—	Jordan Ellenburger

Ector	Gulf	Goldsmith #460-56	Sec. 9, Blk. 44, T-1S, T&P	5600	5600	F. 707	Clear Fork	—	Goldsmith 5600
Ector	Gulf	Goldsmith #466-56	Sec. 16, Blk. 44, T-1S, T&P	5608	5608	F. 983	Clear Fork	—	Goldsmith 5600
Ector	Gulf	Goldsmith #446-56-D	Sec. 15, Blk. 44, T-1S, T&P	7980	7980	F. 1526 F. 1270	Clear Fork Devonian	—	Goldsmith 5600 & Devonian
Gaines	Atlantic	Proctor #1	Sec. 356, Blk. G, CCSD&RGNG	5185	5133	P. 24 + 95 W	San Andres	—	West Seminole
Hockley	Livermore	DeVitt #1	Lab. 6, Lge. 29, Rusk CSL	4937	4884	P. 128	San Andres	—	Levelland
Hockley	Livermore	Parsons #1	Lab. 25, Lge. 30, Baylor CSL	4909	4909	F. 188	San Andres	—	Levelland
Hockley	Seaboard	Whirley #1	Lab. 21, Lge. 732 State Capitol Lds.	4805	4805	P. 304	San Andres	—	Levelland
Hockley	Woodley	Alderson #1	Sec. 10, Blk. A, R. E. Thompson	5979	5979	P. 157	Clear Fork	—	Smyer
Pecos	Humble	F. Turner #1	Sec. 18, Blk. 119, GC&SF	3010	3010	P. 39 + 45 W	Yates	—	Fort Stockton
Pecos	Humble	Terrell "D" #1	Sec. 506, Garcia Montes & Duren	2926	2926	F. 113	Yates	—	Fort Stockton
Reagan	Amerada	Owens #2	Sec. 6, Blk. D, HE&WT	9246	9170	F. 71 in 7 hrs.	Ellenburger	—	Barnhart
Reagan	Amerada	TXL "C" #1	Sec. 235, Blk. 1, T&P	9200	9200	F. 211	Ellenburger	—	Barnhart
NEW MEXICO			NEW-FIELD WILDCATS						
Eddy	Harvey Yates	Ohio-State #1	13-18S-28E	3018	3018	F. 100 BOPD	San Andres	Sub. Surf.	Nichols
Lea	Gulf	La Munyon #6	28-23S-37E	10218	9707	F. 900 BOPD	McKee (Simpson)	Sub. Surf. & Seis.	Teague
Lea	Skelly	Sims #7	3-23S-37E	10284	6616	F. 126 BOPD	Drinkard (Yeso)	Sub. Surf. & Seis.	South Drinkard
Lea	J. C. Clower	State #1	16-21S-34E	3948	3948	F. 218 BOPD	Seven Rivers	Sub. Surf.	Wilson West
Lea	Magnolia	Santa Fe "A" #1	30-9S-36E	4881	4881	P. 3 BO & 40 BWPD	San Andres	Sub. Surf. & Seis.	Crossroads Slaughter
Lea	Mid-Continent	Sawyer "A" #1	27-9S-36E	12258	12258	F. 3744 BOPD	Devonian	Sub. Surf. & Seis.	Crossroads
Lea	Peckham and Clark	Hightower #1	31-18S-32E	4252	4252	P.49 BOPD	Grayburg	Sub. Surf.	Watkins Grayburg
Lea	Continental	Warren "B-29" #1	29-20S-38E	9070	9070	F. 3528 BOPD	McKee (Simpson)	Sub. Surf. & Seis.	Warren
Lea	Leonard Oil Co.	Leonard #1	11-26S-37E	3511	3443	F.80 BOPD	Queen	Sub. Surf.	Leonard
Lea	Shell	Taylor-Glenn #1	3-21-37	8590	6720	F. 12,000 MCF	Drinkard (Yeso)	Sub. Surf.	North Drinkard
			NEW-POOL WILDCATS						
Lea	Rowan Drilling Co.	Will Cary #5	22-22S-37E	8086	7190	F. 213 BOPD	Montoya	Sub. Surf.	Cary
Lea	Gulf	Elson #1	21-23S-37E	9685	3600	F. 686 MCFPD	Seven Rivers	Sub. Surf.	Unnamed
Lea	Amerada	State "F" #1	36-19S-36E	10255	9930	F. 111 BOPD & 9% W	McKee (Simpson)	Sub. Surf.	Monument McKee
Lea	Gulf	Graham-State "F" #1	36-19S-36E	9822	7277	F. 43 BOPD	Abo	Sub. Surf.	Monument Abo
			DEEPER-POOL TESTS						
Lea	Texas Co.	Phillips #1	1-20S-37E	9953	5700	F. 163 BOPD	Yeso	—	Monument Blinebry
Lea	Amerada	Phillips #5	1-20S-36E	9953	5180	F. 840 BOPD	Yeso	—	Monument Paddock
Lea	Western Prod. Co.	Keely "C" #27	26-17S-29E	3407	3322	F.99 BOPD	San Andres	—	Grayburg Keely
			OUTPOSTS (SUCCESSFUL)						
Lea	Texas Co.	State Al. #2	26-21S-34E	3850	3850	P. 26 BFPD 16% BS&W	Seven Rivers	—	Wilson
Lea	Delfern	Lea State "A" #1	8-17S-34E	4723	4723	F. 333 BOPD	San Andres	—	Vacuum North
Lea	Devonian	Landreth Prod. #1	18-9S-38E	5015	5015	F. 2750 MCF GPD (Sour)	San Andres	—	Brown
Lea	Gulf	Saltmount #1	21-23S-37E	9600	9600	F. 336 BOPD	McKee (Simpson)	—	Teague
Lea	Gulf	Travis #1	21-23S-37E	9662	9662	F. 34 BO & 38 BWPD	McKee (Simpson)	—	Teague

TABLE V

OIL AND GAS FIELDS OF WEST TEXAS
AND
SOUTHEAST NEW MEXICO DISCOVERED BEFORE 1948

FIELD	COUNTY	PRODUCING UNITS	GEOLOGIC SYSTEM	DISCOVERY DATE	DEPTH TO PAY	PRODUCERS DRILLED IN 1948	DRY HOLES DRILLED IN 1948	TOTAL PRODUCERS 1-1-49	DEEPEST FORMATION TESTED AND TOTAL DEPTH
Texas									
Abell Ordovician	Pecos	Simpson Ellenburger	Ordovician Ordovician	Nov.'40 Nov.'40	5350 6200			75	Ellenburger 7483
Abell Permian	Pecos	Clear Fork Wichita	Permian	July'41	3350 3800			19	Pre-Cam 5745
Abell Upper Permian	Pecos	San Andres	Permian	Sept.'41	2300	4	1	5	Pre-Cam 5745
Adair	Gaines & Terry	San Andres	Permian	May'47	4870	49	5	88	San Andres 4955
Addie Deep	Ector	Canyon	Pennsylvanian	Feb.'47	8495			1	Ellenburger 13,620
Alex	Terry	San Andres	Permian	May'45	5100			3	San Andres 5243
Andector Clearfork	Ector	Clear Fork	Permian	June'47	6200	6		11	Ellenburger 8600
Andector Ellenburger	Ector	Ellenburger	Ordovician	Sept.'46	7870	42	2	69	Pre-Cam 8562
Anton Irish	Hale & Lamb	Clear Fork	Permian	May'44	5992	80	5	115	Pre-Cam 11,730
Apco Warner	Pecos	Ellenburger	Ordovician	June'39	4400			48	Ellenburger 5350
Barnhart	Reagan	Ellenburger	Ordovician	Sept.'41	9050	14	1	62	Ellenburger 9394
Bedford Devonian	Andrews	Devonian	Devonian	Nov.'45	8775	3		8	Ellenburger 11,670
Bedford Ellenburger	Andrews	Ellenburger	Ordovician	Nov.'45	11,018	3		8	Ellenburger 11,670
Benedum	Upton	Ellenburger	Ordovician	Dec.'47	11,885	6	1	7	Pre-Cam 12,505
Big Lake Deep	Reagan	Ellenburger	Ordovician	Dec.'28	8800			15	Pre-Cam 9562
Big Lake Permian	Reagan	Queen San Andres Clear Fork	Permian	Feb.'23	2440 2962 4373			189	Pre-Cam 9562
Blackwell	Coke	Cisco	Pennsylvanian	May'43	3821			1	Pennsylvanian 3828
Block 12	Andrews	Clear Fork	Permian	Aug.'46	7170			28	Ellenburger 10,760
Block 12 Devonian	Andrews	Devonian	Devonian	Jan.'47	8450			1	Ellenburger 10,760
Block 31 Devonian	Crane	Devonian	Devonian	Nov.'45	8815	11		38	Pre-Cam 11,645
Block 31 Ellenburger	Crane	Ellenburger	Ordovician	Dec.'45	10,290			11	Pre-Cam 11,645
Block 47 Shallow	Crockett	San Andres	Permian	Oct.'47	2110	7	1	10	Ellenburger 10,232
Bolt	Kimble	Ellenburger	Ordovician	Sept.'38	1800		1	2	Ellenburger 2074
Brahaney	Yoakum	San Andres	Permian	June'45	5272			1	San Andres 5301
Byrd	Ward	Yates	Permian	Mar.'42	2600			7	Yates 3200
Carter	Glasscock	San Andres	Permian	Mar.'39	2650		1	12	San Andres 2700
Cedar Lake	Gaines	San Andres	Permian	Sept.'39	4500	11		80	Mississippian 11.954
Chancellor	Pecos	Delaware Sand	Permian	Mar.'42	5240			2	DelawareMtn. 6000
Cheyenne	Winkler	San Andres	Permian	Dec.'47	3285	1		2	San Andres 3340
Childress	Crockett	Ellenburger	Ordovician	Aug.'47	8100	1		2	Cambrian 9270
Clabber Hill	Andrews	Glorieta	Permian	July'43	5600			2	Clear Fork 7500
Clara Couch	Crockett	Grayburg San Andres	Permian	Aug.'41	1950	9	1	43	Ellenburger 8264
Clara Couch Wolfcamp	Crockett	Wolfcamp	Permian	June'47	5670	1		4	Ellenburger 8264
Coble	Hockley	San Andres	Permian	Nov.'45	4800	Combined with Slaughter			
Coleman Ranch	Mitchell	Clear Fork	Permian	Sept.'46	2560	15		42	Clear Fork 2770
Cowden, Crane	Crane	Grayburg San Andres	Permian	Feb.'26	2000	1		72	San Andres 3000

Texas

Cowden, North	Ector	Grayburg	Permian	Sept.'30	4150	20		663	Pennsylvanian 10,829
Cowden, North Deep	Ector	San Andres	Permian	June'39	5100	9		54	Pennsylvanian 10,829
Cowden, South	Ector	Grayburg	Permian	Sept.'30	4030	71	1	214	San Andres 5500
Cravens	Lubbock	Clear Fork	Permian	Sept.'44	6050			1	Permian 8800
Crockett	Crockett	Grayburg	Permian	Apr.'38	1370	8		67	San Andres 1635
Crossett	Crane & Upton	Devonian	Devonian	Aug.'44	5330	3	2	18	Ellenburger 6710
Crossett 3200	Crane	San Angelo	Permian	June'44	3190			1	Ellenburger 6710
Dean	Cochran	San Andres	Permian	July'37	4990	Combined with Slaughter			
Deep Rock	Andrews	San Andres	Permian	Aug.'30	4400	2		23	Clear Fork 7520
Dobbs	Ward	Queen	Permian	Feb.'36	2535			1	Grayburg 2600
Dollarhide Devonian	Andrews	Devonian	Devonian	Aug.'45	7900	20	1	40	Ellenburger 10,210
Dollarhide Ellenburger	Andrews	Ellenburger	Ordovician	Oct.'47	9975	23		26	Ellenburger 10,210
Dollarhide Silurian	Andrews	Fusselman	Silurian	Jan.'47	8320	15		18	Ellenburger 10,210
Doss	Gaines	Clear Fork	Permian	Aug.'44	7000	12	1	38	Wolfcamp 9049
Dune	Crane	Grayburg	Permian	May'38	3130	22	1	61	San Andres 3795
Eaves	Winkler	Yates	Permian	Feb.'37	2965	1		23	Grayburg 3185
Eden	Concho	Pennsylvanian	Pennsylvanian	May'45	4215			4	Ellenburger 5010
Edwards	Crane	Grayburg	Permian	June'36	3300	4		37	San Andres 3695
Ella Waddell	Crane	Grayburg	Permian	July'40	3600	4		9	San Andres 4002
Embar Ellenburger	Andrews	Ellenburger	Ordovician	May'42	7850			24	Pre-Cam 8370
Embar Permian	Andrews	Clear Fork	Permian	Nov.'42	6225			14	Pre-Cam 8370
Emma	Andrews	San Andres	Permian	Apr.'37	4000	1		77	Clear Fork 5619
Emperor	Winkler	Yates & Seven Rivers	Permian	July'32	2830	4		87	Tubbs 6255
Emperor Deep	Winkler	Seven Rivers & Queen	Permian	Oct.'34	3000	4	1	41	Tubbs 6255
Emperor Holt	Winkler	San Angelo	Permian	Mar.'46	4765	7		13	Tubbs 6255
Fort Stockton	Pecos	Yates	Permian	Aug.'44	2840	4		50	Delaware Mtn. 4903
Foster	Ector	Grayburg	Permian	Dec.'32	4100	20	2	654	Clear Fork 6575
Freund	Andrews	Ellenburger	Ordovician	Dec.'46	10,460	Combined with Nelson			
Friend	Reagan	San Andres	Permian	Jan.'47	2390			2	San Andres 2465
Fromme	Pecos	Queen & Grayburg	Permian	Mar.'39	1450			9	Grayburg 1750
Fuhrman Mascho	Andrews	Grayburg & San Andres	Permian	June'30	4288	59	2	278	Wichita 7810
Fullerton	Andrews	Clear Fork	Permian	Mar.'42	6800	47	2	563	Ellenburger 11,169
Fullerton 8500	Andrews	Devonian	Devonian	Aug.'44	8470	8		66	Ellenburger 11,169
Fullerton Ellenburger	Andrews	Ellenburger	Ordovician	Dec.'45	9867	1		7	Ellenburger 11,169
Fullerton North Devonian	Andrews	Devonian	Devonian	June'47	8120	2		3	Ellenburger 11,169
Fullerton San Andres	Andrews	San Andres	Permian	May'45	4580			1	Ellenburger 11,169
Fullerton Wolfcamp	Andrews	Wolfcamp	Permian	Apr.'47	7960			2	Ellenburger 11,169
Garden City	Glasscock	Mississippian	Mississippian	Oct.'46	9740			1	Pre-Cam 10,970
Garza	Garza	San Andres	Permian	May'38	2800	60	5	251	San Andres 3608
Goldsmith	Ector	San Andres	Permian	May'35	4160	18		1035	Ellenburger 9811
Goldsmith 5600	Ector	Clear Fork	Permian	Nov.'47	5600	14	1	15	Ellenburger 9811
Goldsmith Clearfork	Ector	Clear Fork	Permian	May.'46	6090	28		52	Ellenburger 9155
Goldsmith Devonian	Ector	Devonian	Devonian	Apr.'47	7980	2		3	Ellenburger 9811
Goldsmith Ellenburger	Ector	Ellenburger	Ordovician	Aug.'47	9495	2		3	Ellenburger 9811
Goldsmith, North	Ector	San Andres	Permian	July'34	4226			9	Silurian 8314
Goldsmith North Devonian	Ector	Devonian	Devonian	Apr.'46	7900			4	Silurian 8314

Texas

Goldsmith North Silurian	Ector	Fusselman	Silurian	Oct.'46	8230	2		4	Silurian 8314
Grass Roots	Pecos	Pleistocene	Quaternary	Oct.41	198	Abandoned			Quaternary 215
Grayson	Reagan	Grayburg & San Andres	Permian	Jan.'28	3000			6	Devonian 9967
Halley	Winkler	Yates & Seven Rivers	Permian	Oct.'44	2750	3		55	San Andres 3896
Harper	Ector	San Andres	Permian	Nov.'34	4100			184	San Andres 4518
Heiner	Pecos	Ellenburger	Ordovician	Mar.'41	5250	1		3	Ellenburger 5655
Henderson	Winkler	Yates & Seven Rivers	Permian	Apr.'36	3050			73	Queen 3500
Hendrick	Winkler	Yates & Seven Rivers	Permian	July'26	2740	1		221	Ellenburger 13,813
Hoover	Crockett	Queen	Permian	Mar.'38	1400	2	1	4	Ellenburger 8440
Howard-Glasscock	Howard & Glasscock	Yates, Seven Rivers Queen, Grayburg, San Andres, San Angelo Clear Fork & Pennsylvanian	Permian & Pennsylvanian	Apr.'26	1280	59	7	976	Ellenburger 10,906
Hurdle	Upton	Grayburg	Permian	Mar.'26	2000			12	Grayburg 3085
Iatan-East Howard	Howard & Mitchell	San Angelo & Clear Fork	Permian	July'26	2600	24	1	412	Wichita 4220
Iatan North	Howard	Clear Fork	Permian	July'42	2950	3	1	17	Clear Fork 4246
Irion	Irion	San Angelo	Permian	Mar.'29	1350			6	Clear Fork 2455
Irish	Hale & Lamb	Clear Fork	Permian	May'46	5511	Combined with Anton			
Jamison	Coke	Canyon	Pennsylvanian	Dec.'46	6200	22	2	41	Ellenburger 7141
Jamison, South	Coke	Pennsylvanian	Pennsylvanian	Dec.'47	6114	2	2	3	Pennsylvanian 6260
Jamison Pollard	Pecos	Seven Rivers	Permian	Feb.'41	2050			5	San Andres 2550
Johnson	Ector	Grayburg	Permian	July'40	4100	1		128	Clear Fork 6100
Jones Ranch	Gaines	Devonian	Devonian	Nov.'45	11,181	4	1	8	Pre-Cam 13,025
Jordan	Crane & Ector	San Andres	Permian	Nov.'27	3650	4		229	Ellenburger 9964
Jordan 4500	Crane & Ector	San Angelo	Permian	Aug.'47	4660	2	1	4	Ellenburger 9964
Jordan Ellenburger	Crane & Ector	Ellenburger	Ordovician	Mar.'47	8925	7	2	9	Ellenburger 9964
Kermit	Winkler	Yates & Seven Rivers	Permian	July'28	3000	3		581	Ellenburger 10,896
Kermit Ellenburger	Winkler	Ellenburger	Ordovician	May'43	10,460			3	Ellenburger 10,896
Keystone Colby	Winkler	Queen	Permian	July'35	2950	8		322	Pre-Cam 10,756
Keystone Devonian	Winkler	Devonian	Devonian	Dec.'46	7860	35		69	Pre-Cam 10,756
Keystone Ellenburger	Winkler	Ellenburger	Ordovician	July'43	8950	1	1	154	Pre-Cam 10,756
Keystone Holt	Winkler	San Andres	Permian	Sept.'43	4750	30		106	Pre-Cam 10,756
Keystone Lime	Winkler	Grayburg & San Andres	Permian	July'35	3300	21	1	124	Pre-Cam 10,756
Keystone Silurian	Winkler	Fusselman	Silurian	Dec.'45	8460	13		44	Pre-Cam 10,756
Lancaster Hill	Crockett	Grayburg	Permian	Apr.'47	1667			3	San Andres 2300
Landon	Cochran	San Andres	Permian	July'45	5040			2	Mississippian 11,166
Landon Strawn	Cochran	Strawn	Pennsylvanian	Dec.'47	10,378	1		2	Mississippian 11,166
Leck	Winkler	Yates & Seven Rivers	Permian	Sept.'28	2700	4		20	San Andres 3962
Lehn Apco	Pecos	Seven Rivers & Queen	Permian	Sept.'39	1670	10	2	92	Whitehorse 1787
Levelland	Hockley & Cochran	San Andres	Permian	Feb.'45	4750	531	7	925	San Andres 5050
Lion	Ward	Delaware Mountain	Permian	Oct.'44	4979			2	Delaware Mtn. 4994
Live Oak	Crockett	Grayburg	Permian	July'40	1984	Abandoned			San Andres 2150
Lowe	Winkler	Clear Fork	Permian	Sept.'46	5200	Abandoned			Clear Fork 5500
Lubbock	Lubbock	Clear Fork	Permian	Aug.'41	5002	1		2	Clear Fork 5002
Mabee	Andrews & Martin	Grayburg	Permian	Nov.'44	4640	11		95	San Andres 4807
Magnolia Sealy	Ward	Yates	Permian	Dec.'30	2735			50	Grayburg 3175
Magnolia Sealy South	Ward	Yates	Permian	Feb.'40	2950	2		21	Grayburg 3281

Texas

Martin Clearfork	Andrews	Clear Fork	Permian	Mar.'45	6790			4	Ellenburger 9160
Martin Ellenburger	Andrews	Ellenburger	Ordovician	Mar.'46	8750	20	2	38	Ellenburger 9160
Martin McKee	Andrews	McKee (Simpson)	Ordovician	May'45	8720	8		10	Ellenburger 9160
Martin San Andres	Andrews	San Andres	Permian	May'40	4405			15	Ellenburger 9160
Martin Wichita	Andrews	Wichita	Permian	Dec.'45	6805			2	Ellenburger 9160
Mason	Loving	Delaware Mountain	Permian	Jan.'37	3950	1	1	8	Delaware Mtn. 4165
Masterson	Pecos	Queen	Permian	Jan.'29	1400			22	Ellenburger 5356
Masterson 3600	Pecos	Clear Fork	Permian	July'43	3540			1	Clear Fork 3557
McCamey	Crane & Upton	Grayburg	Permian	Sept.'25	2000	30	2	900	Ellenburger 8358
McCamey Silurian	Upton	Fusselman	Silurian	Nov.'43	7125	1		2	Ellenburger 8358
McElroy	Crane & Upton	Grayburg	Permian	Mar.'26	2700	75	1	808	Ellenburger 12,786
McKee	Crane	Simpson	Ordovician	Sept.'42	6126			2	Ellenburger 7204
Means	Andrews	Grayburg & San Andres	Permian	Aug.'34	4250	18	3	202	Ellenburger 14,093
Midland	Midland	Strawn	Pennsylvanian	Nov.'45	10,370	Abandoned			Ellenburger 11,630
Midland, South	Midland	Wolfcamp	Permian	Feb.'47	8500			1	Ellenburger 11,445
Midland Farms	Andrews	Grayburg	Permian	June'44	4840	17	1	39	San Andres 4942
Midway Lane	Crockett	Ellenburger	Ordovician	Aug.'47	7530	26	2	31	Ellenburger 7680
Monahans Ellenburger	Ward	Ellenburger	Ordovician	July'42	10,082			7	Ellenburger 10,545
Monahans Clearfork	Ward	Clear Fork	Permian	Aug.'45	4685	13	2	36	Devonian 8058
Monahans North	Winkler	Clear Fork	Permian	Mar.'44	6069			6	Clear Fork 6399
Monahans North Glorieta	Winkler	Glorieta	Permian	Aug.'46	5115			2	Glorieta 5224
Monahans Permian	Ward	Wolfcamp	Permian	Mar.'42	5635			2	Ellenburger 10,545
Monroe	Ward	Delaware Mountain	Permian	Feb.'30	4663			1	Delaware Mtn. 4673
Moore	Howard	Grayburg	Permian	June'27	3200	5		22	Ellenburger 10,366
Morita	Howard	Grayburg	Permian	July'44	3200			3	San Andres 3585
Morrow	Menard	Pennsylvanian	Pennsylvanian	July'46	2309		1	1	Cambrian 4585
Nelson	Andrews	Ellenburger	Ordovician	July'46	10,382	2		6	Pre-Cam 10,606
Netterville	Pecos	Yates	Permian	Oct.'24	2250			14	Grayburg 2750
Noelke	Crockett	Seven Rivers	Permian	Apr.'40	1032	1	2	43	San Andres 2877
Oates	Pecos	Rustler	Permian	Apr.'47	790	1		2	Rustler 845
Olson	Crockett	Grayburg & San Andres	Permian	Sept.'42	2065	7		40	San Andres 2322
Ownby	Yoakum	San Andres	Permian	Apr.'41	5250			48	San Andres 5502
Page	Schleicher	Pennsylvanian	Pennsylvanian	Dec.'35	5520	14		32	Ellenburger 6380
Parker	Andrews	San Andres	Permian	Jan.'35	4700	2		4	San Andres 4950
Payton	Pecos & Ward	Yates	Permian	July'37	1950	1		120	Yates 2313
Pecos Valley High Gravity	Pecos	Yates	Permian	Aug.'29	1400	27	7	148	Simpson 7480
Pecos Valley, Low Gravity	Pecos	Yates	Permian	Dec.'28	1400		1	62	Simpson 7480
Penwell	Ector	San Andres	Permian	Nov.'29	3500	5	1	182	Ellenburger 9357
Penwell Ellenburger	Ector	Ellenburger	Ordovician	Apr.'46	8890			2	Ellenburger 9357
Petersburg	Hale	Pennsylvanian	Pennsylvanian	Mar.'47	6992			1	Pre-Cam 8394
PHD	Garza	San Andres	Permian	Mar.'45	3400			8	Pre-Cam 9603
Polar	Kent	Ellenburger	Ordovician	May'46	7773			3	Ellenburger 7938
Pyote	Ward	Yates	Permian	Mar.'42	2820			2	Queen 3100
Rhodes	Cochran	San Andres	Permian	Mar.'41	5050			1	San Andres 5150
Richards	Pecos	Dewey Lake	Permian	Oct.'29	1300			3	San Andres 4360

Texas

Riley	Gaines	Clear Fork	Permian	June'47	7045			1	Clear Fork 7251
Riley, North	Gaines	Clear Fork	Permian	Sept.'47	6930	5		8	Clear Fork 7290
Robertson	Gaines	Clear Fork	Permian	Nov.'42	5910	10		20	Wichita 7686
Russell	Gaines	Clear Fork	Permian	Feb.'43	6100 & 7300	6		38	Wolfcamp 9668
Sand Hills Ellenburger West	Crane	Ellenburger	Ordovician	Apr.'37	5920			8	Ellenburger 6391
Sand Hills McKnight	Crane	San Andres	Permian	Oct.'35	3230	7	1	32	Ellenburger 7614
Sand Hills Ordovician	Crane	Simpson	Ordovician	Oct.'35	5550			31	Ellenburger 6709
Sand Hills Tubb	Crane	Clear Fork	Permian	Mar.'30	4200	23		304	Ellenburger 7614
Sand Hills West	Crane	San Angelo	Permian	June'43	3800			3	Ellenburger 7891
Scarborough	Winkler	Yates	Permian	Oct.'27	2900	2		113	Whitehorse 3600
Scarborough North	Winkler	Grayburg	Permian	Feb.'48	3258	13	(Extension to Rhodes Field, Lea Co., New Mexico)	13	
Scott	Ward	Delaware Mountain	Permian	Mar.'46	4839			1	Delaware Mtn. 3920
Seminole 5200	Gaines	San Andres	Permian	Mar.'36	5000	2	1	331	Wolfcamp 9312
Seminole 6300	Gaines	San Angelo	Permian	Dec.'47	6330 & 6520		1	1	Wolfcamp 9312
Shafter Lake Devonian	Andrews	Devonian	Devonian	Oct.'47	9700	36	3	37	Ellenburger 11,898
Shannon Grayburg	Crockett	Grayburg	Permian	May'43	2190	1	1	4	Ellenburger 8440
Shannon San Andres	Crockett	San Andres	Permian	May'47	2355	5	1	33	Ellenburger 8440
Sharon Ridge 1700	Scurry & Mitchell	San Andres	Permian	Mar.'25	1500 & 1700	134	5	395	Clear Fork 3300
Sharon Ridge 2400	Scurry & Mitchell	San Angelo & Clear Fork	Permian	June'38	2400	5		130	Wichita 3545
Shearer	Pecos	Seven rivers & Queen	Permian	Mar.'32	1350			43	Whitehorse 1750
Shipley	Ward	Queen	Permian	Nov.'28	1800 & 3100	3		148	Ellenburger 9187
Shipley Silurian	Ward	Fusselman	Silurian	Dec.'40	7010			2	Ellenburger 9187
Simpson	Crockett	Seven Rivers	Permian	Oct.'47	1527	4		7	Grayburg 1551
Slaughter	Cochran, Hockley & Terry	San Andres	Permian	Sept.'36	4950	60	1	2089	Clear Fork 7000
Smyer	Hockley	Clear Fork	Permian	Jan.'44	5850	2		5	Clear Fork 6000
Snyder	Howard	San Angelo	Permian	May'37	2600			106	Clear Fork 3150
Spencer	Ward	Yates	Permian	June'41	2500 & 2700			14	Seven Rivers 3000
Sprayberry	Dawson	San Andres	Permian	Jan.'46	3730			11	Ellenburger 11,136
Tankersley	Irion	Pennsylvanian	Pennsylvanian	July'45	7195			1	Ellenburger 8357
Taylor-Link	Pecos	Yates & Queen	Permian	June'29	990 & 1650	3		157	Wichita 4433
Three Bar	Andrews	Devonian	Devonian	Mar.'45	8300	10	1	19	Ellenburger 10,466
Tippett	Crockett	Wolfcamp	Permian	Nov.'47	6306	5	1	6	Ellenburger 7796
Toborg	Pecos	Cretaceous	Cretaceous	May'28	350	190	31	592	Grayburg 1400
Todd Crinoidal	Crockett	Strawn	Pennsylvanian	Apr.'40	5950	2		32	Ellenburger 7143
Todd Deep	Crockett	Ellenburger	Ordovician	Apr.'40	6232	3	1	60	Ellenburger 7143
Tucker	Crane	Simpson	Ordovician	Feb.'46	5770	3		4	Simpson 6303
Tunstill	Reeves	Delaware Mountain	Permian	Oct.'47	3268	37		44	Delaware Mtn. 3312
TXL Devonian	Ector	Devonian	Devonian	Jan.'45	7698	17		125	Ellenburger 11,506
TXL Ellenburger	Ector	Ellenburger	Ordovician	Feb.'45	9297	16	1	157	Ellenburger 11,506

Texas

TXL Silurian	Ector	Fusselman	Silurian	Oct.'46	8465	1		2	Ellenburger 11,506
TXL Upper Clearfork	Ector	Clear Fork	Permian	July'46	5615	15		31	Ellenburger 11,506
TXL Wolfcamp	Ector	Wolfcamp	Permian	June'46	7545			1	Ellenburger 11,506
Union	Andrews	Clear Fork & Wichita	Permian	May'43	7300	4		34	Pre-Cam 9714
University Block 39	Crockett	Ellenburger	Ordovician	June'47	8044			2	Cambrian 9000
University Waddell Ellenburger	Crane	Ellenburger	Ordovician	May'47	10,620	6	1	8	Ellenburger 10,920
Upland	Upton	Wolfcamp	Permian	Aug.'45	9978	Abandoned			Devonian 10,745
Vaughan	Crockett	San Andres	Permian	Sept.'47	1500	4	1	5	San Andres 1501
Verhalen	Reeves	Wolfcamp	Permian	July'47	9917		1	1	Pennsylvanian 14,073
Vincent	Howard	Clear Fork	Permian	May'43	4038			3	Ellenburger 8413
Waddell	Crane	Grayburg & San Andres	Permian	Nov.'27	3550	9		152	San Andres 4002
Waddell Ellenburger	Crane	Ellenburger	Ordovician	Sept.'46	10,600			2	Ellenburger 11,060
Walker	Pecos	Queen & Grayburg	Permian	Apr.'40	1800	2	2	86	San Andres 3900
Waples Platter	Yoakum	San Andres	Permian	Feb. '39	5200			14	San Andres 5515
Ward North Estes	Ward	Yates & Seven Rivers	Permian	June'27	2700 & 3100	23	1	921	San Andres 3819
Ward, South	Ward	Yates & Seven Rivers	Permian	Dec.'37	2450 & 3100		1	489	Mississippian 10,009
Wasson 5100	Gaines & Yoakum	San Andres	Permian	Apr.'36	4890	20	1	1591	Ellenburger 11,108
Wasson 6600	Gaines	Clear Fork	Permian	Dec.'40	6300	1		21	Ellenburger 11,108
Wasson 7200	Gaines	Clear Fork	Permian	Dec.'41	7150	1		8	Ellenburger 11,108
Webb-Ray	Upton	Grayburg	Permian	Feb.'37	2110			1	San Andres 2176
Weiner	Winkler	Queen	Permian	Aug.'40	3000	1		66	Grayburg 3180
Welch	Dawson	San Andres	Permian	Jan.'42	4918	25	2	158	San Andres 4980
Wentz	Pecos	Ellenburger & Granite Wash	Ordovician & Cambrian	Dec.'41	4307			2	Pre-Cam 4634
West	Yoakum	San Andres	Permian	July'37	5126			1	San Andres 5195
West Andrews	Andrews	San Andres	Permian	July'40	4350			16	Ellenburger 9160
Westbrook	Mitchell	Clear Fork	Permian	Jan.'20	2900			157	Ellenburger 8201
Wheat	Loving	Delaware Mountain	Permian	Sept.'25	4212			76	Delaware Mtn. 5083
Wheeler Devonian	Winkler & Ector	Devonian	Devonian	Apr.'45	8540	10	1	45	Ellenburger 10,813
Wheeler Ellenburger	Winkler & Ector	Ellenburger	Ordovician	July'43	10,300	6		41	Ellenburger 10,813
Wheeler Silurian	Winkler & Ector	Fusselman	Silurian	Dec.'45	9220	1	1	3	Ellenburger 10,813
Whiteface	Cochran & Hockley	San Andres	Combined with Levelland						
White & Baker	Pecos	Queen & San Andres	Permian	Jan.'35	1650	5	2	80	Ellenburger 9811
White & Baker Strawn	Pecos	Strawn	Pennsylvanian	Dec.'45	7580			1	Ellenburger 9811
World Powell	Crockett	Grayburg	Permian	June'25	2450	5		122	San Andres 3695
Wyatt	Crockett	San Andres	Permian	Dec.'32	1224		1	1	Ellenburger 7143
Yarborough & Allen	Ector	Ellenburger	Ordovician	Sept.'47	10,596	8	2	9	Ellenburger 10,620
Yates	Pecos	Grayburg & San Andres	Permian	Oct.'26	1150	7	2	594	Ellenburger 9114
Yates Sealy South	Ward	Yates	Permian	July'46	2813	4		10	Yates 2813
Yates Smith Sand	Pecos	Yates	Permian	Oct.'33	990	1	3	21	Ellenburger 9114
Yellowhouse	Hockley	San Andres	Permian	Apr.'44	4596	22	3	36	San Andres 4685
New Mexico									
Anderson	Eddy	Brayburg	Permian	Feb.'40	2520	5		32	San Andres 3634

New Mexico									
Arrowhead	Lea	Queen Grayburg	Permian	June'38	3650	1		123	San Andres 4350
Artesia	Eddy	Yates Queen Grayburg	Permian	Aug.'23	460 & 1875	26	7	181	San Andres 4035
Atoka	Eddy	San Andres	Permian	Mar.'41	1485			1	Yeso 4350
Barber	Eddy	Yates	Permian	Feb.'37	1400			10	Queen 1860
Benson	Eddy	Seven Rivers	Permian	July'43	1725			5	San Andres 2988
Black River	Eddy	Delaware Mountain	Permian	May'37	3649	1	1	3	Delaware Mtn. 4320
Blinebry	Lea	Yeso	Permian	Dec.'45	5560	2		7	Pre-Cam 7597
Bowers	Lea	Seven Rivers	Permian	Oct.'46	3150	29	4	72	Abo 8010
Brunson	Lea	Ellenburger	Ordovician	Sept.'45	8059	21		69	Pre-Cam 8370
Burton	Eddy	Yates	Permian	June'34	1160			1	San Andres 4085
Cap Rock	Chaves & Lea	Queen	Permian	Nov.'40	3025	30	4	126	San Andres 4385
Cass	Lea	Abo	Permian	Dec.'44	7700	1		4	Pre-Cam 10,465
Cave	Eddy	Grayburg	Permian		2450	Abandoned			San Andres 3080
Comanche	Chaves	San Andres	Permian		1254	Abandoned Jan. 1945			Pre-Cam 6630
Cooper-Jal	Lea	Yates Seven Rivers	Permian	May'27	3300 & 3550	5	2	107	Grayburg 5118
Daugherty	Eddy	Grayburg	Permian	Nov.'38	1800			3	Yeso 3030
Dayton	Eddy	Grayburg	Permian	July'40	1000			10	San Andres 2545
Drinkard	Lea	Yeso	Permian	Oct.'44	6375	88	2	309	Pre-Cam 8145
Dublin	Lea	Ellenburger	Ordovician	Nov.'44	11,830	Abandoned 1947			Ellenburger 12,535
Eaves	Lea	Yates Seven Rivers	Permian	Oct.'29	3150	1		27	Seven Rivers 3542
Empire	Eddy	Yates Grayburg	Permian	June'24	450 & 1500	1	1	86	San Andres 4383
Eunice-Monument	Lea	Grayburg San Andres	Permian	Mar'29	3650 & 3825	1	1	975	Ellenburger 9953
Eunice-South	Lea	Seven Rivers	Permian	May'30	3720	8		103	Yeso 6202
Eunice-West	Lea	Seven Rivers	Permian	Aug.'28	3773	9	2	43	San Andres 4695
Fenton	Eddy	Delaware Mountain	Permian	Sept.'43	2638	Abandoned 1945			Delaware Mtn. 3525
Forrest	Lea	San Andres	Permian	Dec.'45	2632	6		12	San Andres 3060
Fren	Eddy	Seven Rivers	Permian	Aug.'36	1925	5	1	68	Abo 6854
Garrett	Lea	San Andres	Permian	Apr.'47	5541			1	Abo 10,085
Getty	Eddy	Yates	Permian	Nov.'27	1365			8	Bone Spring 6683
Grayburg-Jackson	Eddy	Queen Grayburg San Andres	Permian	Feb.'29	2000 & 3800	14	4	314	Abo 6866
Halfway	Lea	Yates	Permian	Oct.'39	2495			5	Queen 4013
Hardy	Lea	Grayburg	Permian	Mar.'36	3710			36	Grayburg 3790
Hare	Lea	Simpson	Ordovician	July'47	7780	2		3	Pre-Cam 8165
Hare South	Lea	Simpson	Ordovician	Spet.'47	7360	2		3	Pre-Cam 7651
Harrison	Lea	Yeso	Permian	Nov.'45	5015			1	Yeso 5075
Henshaw	Eddy	Grayburg	Permian	Feb.'40	3150			1	San Andres 3850
High Lonesome	Eddy	Queen	Permian	Nov.'39	1775			4	San Andres 3105
High Lonesome South	Eddy	Grayburg	Permian	Feb.'40	2120			1	San Andres 2845
Hobbs	Lea	San Andres	Permian	Dec.'28	4050	4	2	255	Basal Permian 8011
Jones	Lea	Yeso	Permian	Nov.'45	6350	Combined with Drinkard 1945			
Langlie-Mattix	Lea	Yates Seven Rivers	Permian	July'35	3350 3500	20	2	352	Pre-Cam 11,014
Leo	Eddy	Grayburg	Permian	Aug.'38	3250			7	San Andres 3860
Loco Hills	Eddy	Grayburg	Permian	Jan.'39	2430	2		208	San Andres 3505

New Mexico									
Lovington	Lea	San Andres	Permian	Jan.'38	4600	1	2	54	San Andres 5501
Lovington West	Lea	San Andres	Permian	June'44	4700	8		53	San Andres 5175
Lusk	Eddy-Lea	Yates	Permian	Nov.'41	2702			4	Queen 4016
Lusk East	Lea	Yates	Permian	Jan.'43	2620	Abandoned 1947			Queen 4016
Lusk West	Eddy	Yates	Permian	Dec.'41	2460			1	Seven Rivers 2769
Lynch	Lea	Yates Seven Rivers	Permian	May'29	3675			9	Seven Rivers 4046
Lynch North	Lea	Yates	Permian	Aug.'29	3660			1	Grayburg 4759
McCormack	Lea	Fusselman	Silurian	Nov.'47	7146	2		3	Pre-Cam 8318
McMillan	Eddy	Queen	Permian	May'38	845	Abandoned			Grayburg 1180
Maljamar	Eddy	Grayburg San Andres	Permian	June '26	3600 4050	11	1	257	Pennsylvanian 13,998
Maljamar North	Eddy	Grayburg	Permian	June'39	3880			1	Pennsylvanian 13,998
Maljamar South	Eddy	Grayburg	Permian	Dec.'39	4645			1	Pennsylvanian 13,998
Paddock	Lea	Paddock	Permian	Apr.'45	5170	5		91	Ellenburger 8370
P.C.A.	Eddy	Yates	Permian	Dec.'39	1500	3		10	Seven Rivers 1956
Pearsall	Lea	Yates Queen	Permian	Jan.'40	3320 3800	1		15	Grayburg 4500
Penrose-Skelly	Lea	Queen Grayburg	Permian	Jan.'36	3500 3700	3		304	Ellenburger 8370
Premier	Eddy	Grayburg	Permian	Mar.'36	3090	1	1	56	Grayburg 3500
Red Lake	Eddy	Yates Seven Rivers Queen Grayburg San Andres	Permian	Oct.'24	800 2100	21	6	69	San Andres 2905
Rhodes	Lea	Yates Seven Rivers	Permian	Jan.'29	3000	3		47	San Andres 4110
Roberts	Lea	Grayburg	Permian	Sept.'43	4195	2		4	San Andres 4660
Roberts West	Lea	Grayburg	Permian	Dec.'45	4192	2		25	San Andres 4419
Robinson	Eddy	Grayburg San Andres	Permian	Aug.'26	3550 3919	1		14	San Andres 4483
Russell	Eddy	Yates	Permian	Apr.'42	785	5	1	31	Delaware Mtn. 2500
Salt Lake	Lea	Yates Seven Rivers	Permian	July'41	2990			6	Queen 4003
San Simon	Lea	Yates	Permian	Nov.'43	3935		1	2	Yates 4183
Sawyer	Lea	San Andres	Permian	Feb.'47	4926	1		2	San Andres 5011
Shugart	Eddy	Yates Queen	Permian	May'38	2600 3450			2	San Andres 4088
Shugart North	Eddy	Queen	Permian	June'38	3350	5		26	San Andres 4890
Skaggs	Lea	Grayburg	Permian	Mar.'38	3800			3	Pre-Cam 10,465
Square Lake	Eddy	Grayburg	Permian	Nov.'41	2700	3	2	318	Abo 6587
Tonto	Lea	Seven Rivers	Permian	June '44	3565			1	Yates 3693
Turkey Track	Eddy	Grayburg	Permian	Aug.'43	3575	1	1	11	Delaware Mtn. 3896
Vacuum	Lea	Grayburg San Andres	Permian	May'29	4315 4650	30	2	395	San Andres 5329
Watkins	Lea	Seven Rivers	Permian	Dec.'45	3564	1		3	San Andres 4180
Weir	Lea	Leonard	Permian	May'46	6760			1	Pre-Cam 10,465
Young	Lea	Queen	Permian	Feb.'45	3768	1		5	San Andres 4880

brian with depths ranging from 5,342 feet to 11,312 feet. The Northwestern shelf, Western shelf, and Southwestern shelf account for almost half of the area covered by this paper. Only a relatively small part has been condemned for oil production.

FUTURE TRENDS

Although great quantities of petroleum remain undiscovered on the Central Basin platform, attention has begun to turn to the east and southeast where recent discoveries, especially in the reefs of the Pennsylvanian, offer additional flush production. It will be remembered, as was mentioned above, that almost half of the huge territory covered by this paper remains to be explored in detail.

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BULLETIN OF THE AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS
VOL. 33, NO. 6 (JUNE, 1949), PP. 931-934, 1 FIG., 2 TABLES

DEVELOPMENTS IN ARIZONA, WESTERN NEW MEXICO, AND NORTHERN NEW MEXICO IN 1948[1]

PAUL H. UMBACH[2]
Albuquerque, New Mexico

ABSTRACT

Twenty-eight wildcat wells were drilled; the total footage of 95,099 feet in western and northern New Mexico. As a result five wildcat wells were commercially productive.

Four wildcat wells were drilled in Arizona; the total footage of 9,651 feet. None was commercially productive.

Seventeen major companies and fifteen independents have established offices within the area, and intense exploration and leasing activity centered in the San Juan basin.

INTRODUCTION

The district considered includes all of Arizona and the northern and western three-fourths of New Mexico (Fig. 1). Eleven fields, all in the San Juan basin, produced 369,850 barrels of oil and 8,631 million cubic feet of gas in 1948. These fields have an accumulated production of 10,751,361 barrels of oil and 68,904 million cubic feet of gas.

DEVELOPMENT

The Blanco field was extended 5 miles southeastward with the completion

TABLE I
OIL AND GAS FIELDS IN NORTHERN NEW MEXICO

*Key Letter**	*Field Name*	*Producing Formation*	*Age*	*Gas or Oil*
		SAN JUAN COUNTY		
A	Barker	Dakota	Cretaceous	Gas
A	Barker (deep)	Paradox	Pennsylvanian	Gas
B	Blanco	Farmington, Pictured Cliffs	Cretaceous	Gas
B	Blanco	Mesaverde	Cretaceous	Gas
C	Bloomfield	Farmington	Cretaceous	Oil
D	Fulcher Basin	Pictured Cliffs	Cretaceous	Gas
E	Hogback	Dakota	Cretaceous	Oil
F	Kutz Canyon	Pictured Cliffs and Dakota	Cretaceous	Gas and oil
G	Oswell	Farmington	Cretaceous	Oil
H	Rattlesnake	Dakota	Cretaceous	Oil
I	Table Mesa	Dakota	Cretaceous	Oil
J	Ute	Dakota	Cretaceous	Gas
J	Ute	Deep Paradox	Pennsylvanian	Gas
		MCKINLEY COUNTY		
K	Hospah	Hospah	Cretaceous	Oil
L	Red Mountain	Mesaverde	Cretaceous	Oil

* See Figure 1.

[1] Manuscript received, April 8, 1949.

[2] District geologist, Stanolind Oil and Gas Company. In preparing this paper the writer has been assisted by the use of Stanolind Oil and Gas Company records which have been assembled as a result of the cooperation of other companies and independents working in the area. Production data were obtained from the New Mexico Oil Conservation Commission.

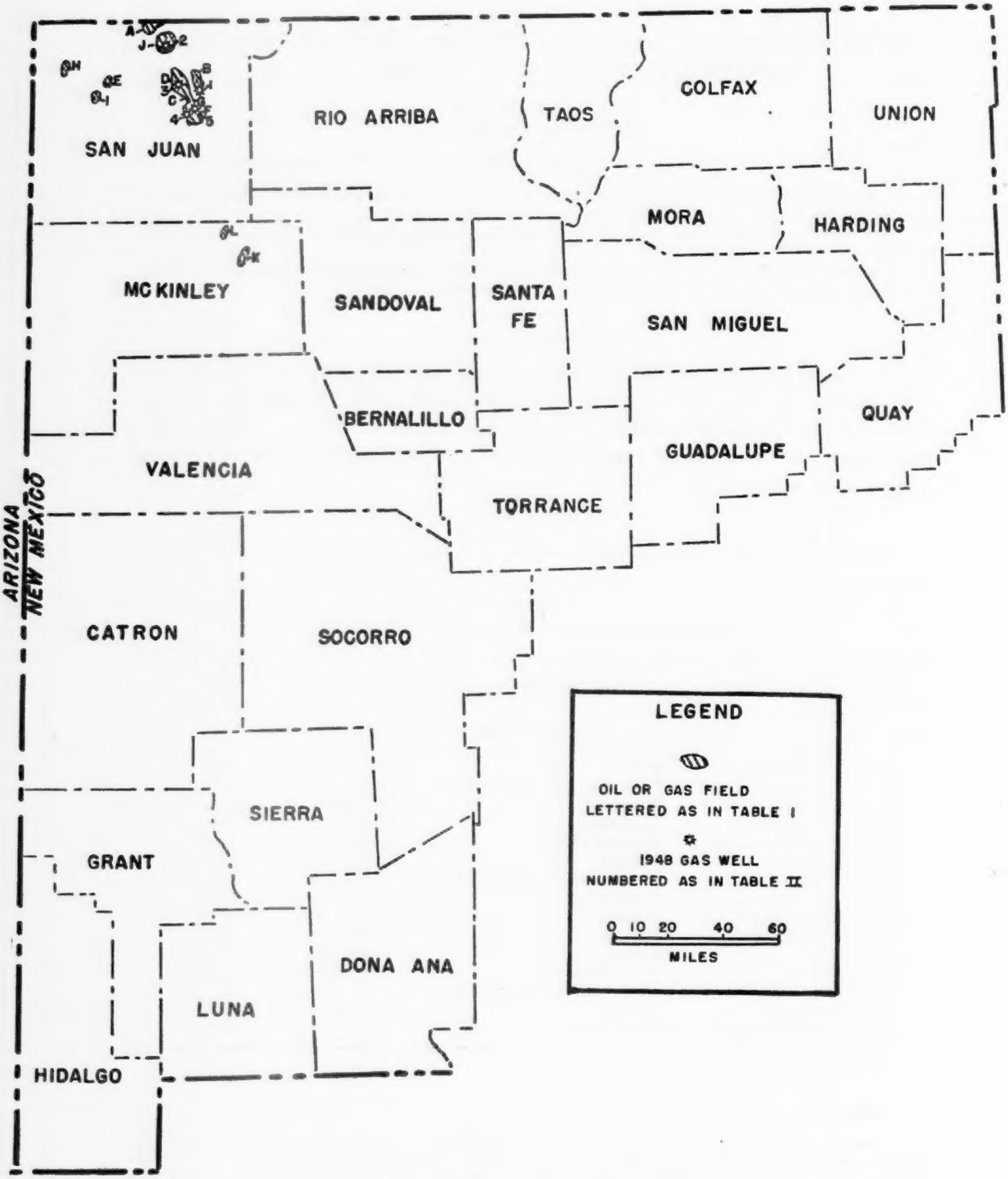
SAN JUAN
RIO ARRIBA
TAOS
COLFAX
UNION
MORA
HARDING
MC KINLEY
SANDOVAL
SANTA FE
SAN MIGUEL
BERNALILLO
QUAY
GUADALUPE
VALENCIA
TORRANCE
ARIZONA
NEW MEXICO
CATRON
SOCORRO
LEGEND
OIL OR GAS FIELD LETTERED AS IN TABLE I
1948 GAS WELL NUMBERED AS IN TABLE II
0 10 20 40 60
MILES
SIERRA
GRANT
DONA ANA
LUNA
HIDALGO

FIG. 1

of the Stanolind Oil and Gas Company's Elliott No. 1 in Sec. 14, T. 29 N., R. 9 W., San Juan County, New Mexico.

The Ute Dome Paradox gas production was proved by the Stanolind Oil and Gas Company's Ute No. 4 in Sec. 35, T. 32 N., R. 14 W., San Juan County, New Mexico.

The Fulcher Basin Mesaverde gas production was proved by Carroll and Cornell's Federal No. 9 in Sec. 12, T. 29 N., R. 12 W., San Juan County, New Mexico.

The Kutz Canyon gas production was extended 5 miles south by the Stanolind, Byrd-Frost, Western Natural's Johnson No. 1 in Sec. 21, T. 27 N., R. 10 W., San Juan County, New Mexico.

The Kutz Canyon gas production was extended 4 miles southeast by the Stanolind, Byrd-Frost, Western Natural's Galt No. 1 in Sec. 1, T. 27 N., R. 10 W., San Juan County, New Mexico.

TABLE II

SUCCESSFUL WILDCATS COMPLETED IN ARIZONA, WESTERN NEW MEXICO, AND NORTHERN NEW MEXICO IN 1948

*Key Number**	*County*	*Well*	*Location*	*Depth (Feet)*	*Formation at Total Depth*	*Date*	*Remarks*
1	San Juan	Stanolind Oil & Gas Co.'s Elliott 1	Sec. 14, T. 29N., R. 9W.	5,106	Mancos	9- 9-48	3,000 MCF gas per day natural
2	San Juan	Stanolind Oil & Gas Co.'s Ute 4	Sec. 35, T. 32N., R. 14W.	8,602	Paradox	9- 8-48	13,100 MCF gas per day, preliminary test. Not completed
3	San Juan	Carroll and Cornell's Federal 9	Sec. 12, T. 29N., R. 12W.	4,482	Mancos	7- 1-48	750 MCF gas per day, preliminary test. Not completed
4	San Juan	Stanolind, Byrd-Frost's Johnson 1	Sec. 21, T. 27N., R. 12W.	2,805	Lewis	10-26-48	800 MCF gas per day
5	San Juan	Stanolind, Byrd-Frost's Galt 1	Sec. 1, T. 27N., R. 10W.	2,109	Lewis	11-26-48	810 MCF gas per day

* See Figure 1.

WILDCAT DRILLING AND EXPLORATION

Wildcat drilling consisted of 32 widely scattered wells, most of which were located on the outer edge of the San Juan basin.

The present production is concentrated within the San Juan basin of New Mexico, a large part of the anticlinal structures having been tested around the outer edge where production might have been obtained at relatively shallow depths. The five successful wildcat wells drilled in 1948 were located near present producing fields within the San Juan basin. Much of the central part of the San Juan basin which has not been explored by drilling is leased by major companies and large independents.

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BULLETIN OF THE AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS
VOL. 33, NO. 6 (JUNE, 1949), PP. 935-944, 1 FIG., 1 TABLE

DEVELOPMENTS IN NORTH AND WEST-CENTRAL TEXAS IN 1948[1]

WALTER L. AMMON,[2] L. W. DORBANDT,[2] AND JOHN H. STOVALL[2]
Wichita Falls and Abilene, Texas

ABSTRACT

During 1948, production in the North and West-Central Texas district increased to 71,469,000 barrels of oil as compared with 62,127,000 barrels produced in 1947. Wichita was the leading producing county with 10,600,000 barrels, followed closely by Archer County, with 9,400,000 barrels. Drilling activity also showed a gain with a total of 4,009 tests drilled in 1948, of which 2,150 were productive. This represents a drilling increase of 34 per cent over the previous year. Of the total wells drilled, 1,113 were exploratory, which resulted in 202 new producing discoveries as against 144 discovered in 1947. These new discoveries include wildcat pools, deeper producers, and extensions.

Among the more important developments and discoveries in the district were: (1) the continued development of the Sherman field in Grayson County; (2) the development of the Chico field and the discovery of distillate in the Signal Oil Company's Daily Well No. 1 in Wise County; (3) Strawn conglomerate discoveries in northeastern Jack County and central Wise County; (4) the discovery of a producing sand and the extension of the Canyon Reef zone in the Round Top field in Fisher County; (5) the development of the Bartlett field in southwestern Jones County; and (6) the development of the Kirk pool in Comanche County.

Surface mapping, subsurface, and the use of the reflection-seismograph continued to play the leading roles in exploratory methods.

INTRODUCTION

The North and West-Central Texas district includes 50 counties which are bounded on the north by the Red River, on the south by the Colorado River, the Eastern Cross-Timbers belt on the east, and the High-Plains on the west.

The more important structural features are the Llano uplift in the south-central part of the district; the Bend flexure which extends northward from the Llano uplift to Wichita County and separates the Forth Worth syncline on the east from the Baylor basin on the west; the Muenster arch which separates the Fort Worth syncline from the Marietta-Sherman basin on the east; and the Electra arch in the northern part of the district which trends westward from Clay County through Cottle County and forms the northern rim of the Baylor basin and the southern rim of the Hardeman basin.

DEVELOPMENT

As in the past several years, development in general continued to show an increase in nearly all types of activity. Production increased from 62,127,000 barrels of oil in 1947 to 71,469,000 barrels in 1948. Wichita County again was the leading producing county with 10,600,000 barrels, followed closely by Archer with 9,400,000 barrels. Archer, Clay, Montague, Throckmorton, Stephens, Jones, and Taylor helped account for the over-all increase.

Drilling activity showed a gain with a total of 4,009 tests drilled in 1948, of

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[2] Stanolind Oil and Gas Company. The writers express their appreciation to T. F. Petty, Humble Oil and Refining Company, K. C. Beresford and Joe Van, Stanolind Oil and Gas Company, Wichita Falls, Texas, for assistance in preparing this paper.

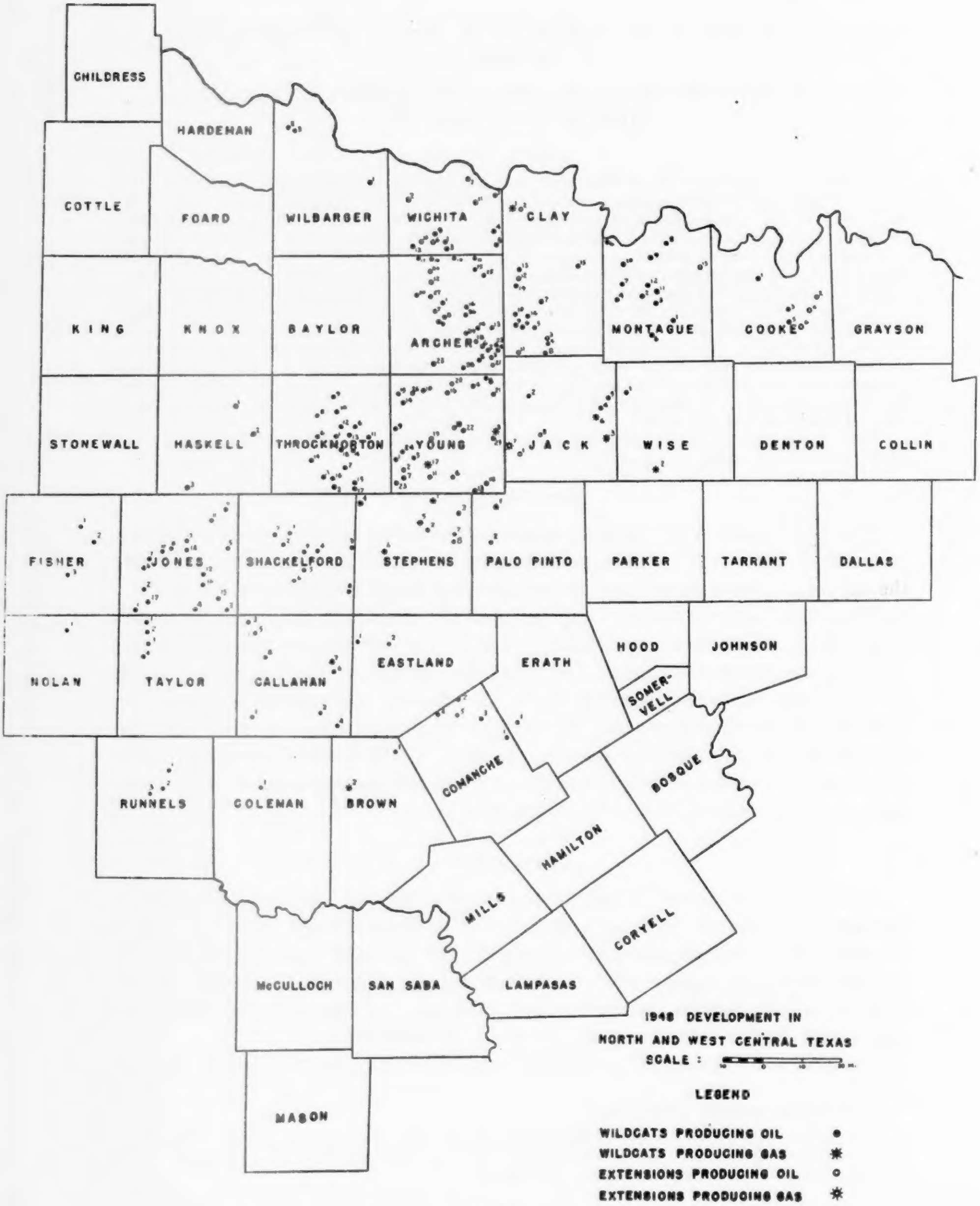
CHILDRESS
HARDEMAN
COTTLE
FOARD
WILBARGER
WICHITA
CLAY
KING
KNOX
BAYLOR
ARCHER
MONTAGUE
COOKE
GRAYSON
STONEWALL
HASKELL
THROCKMORTON
YOUNG
JACK
WISE
DENTON
COLLIN
FISHER
JONES
SHACKELFORD
STEPHENS
PALO PINTO
PARKER
TARRANT
DALLAS
NOLAN
TAYLOR
CALLAHAN
EASTLAND
ERATH
HOOD
JOHNSON
SOMER-VELL
COMANCHE
BOSQUE
RUNNELS
COLEMAN
BROWN
HAMILTON
MILLS
CORYELL
McCULLOCH
SAN SABA
LAMPASAS
MASON
1948 DEVELOPMENT IN
NORTH AND WEST CENTRAL TEXAS
SCALE :
LEGEND
WILDCATS PRODUCING OIL
WILDCATS PRODUCING GAS
EXTENSIONS PRODUCING OIL
EXTENSIONS PRODUCING GAS

FIG. 1

which 2,150 were productive. This represented a drilling increase of 34 per cent over the previous year. Of the total number of wells drilled, 1,113 were classified as exploratory, which resulted in 202 new producing discoveries as against 144 discoveries in 1947. These new discoveries, which include wildcat pools, deeper producers, and extensions, are listed by counties in Table I with the producing formation, depth of producing zones, initial production, and method of exploration shown. Figure 1 shows the geographical location of the discoveries.

Development and exploration continued in the counties along and immediately flanking the Bend arch and the Red River uplift. Interest in the western counties was concentrated chiefly in Haskell, Stonewall, and Fisher counties, with several deep tests being drilled. Though initiated in the preceding year, the increased interest and activity in the Fort Worth basin in eastern Jack, western Wise, and northern Parker counties were outstanding.

With no attempt at estimates of relative importance, the following are some of the more important developments during the past year.

1. In Grayson County, the Sherman field developed from 1 to 20 wells with most of the extension on the southeast. All the producing strata in this field are Strawn sandstones. Disappointing was the lack of any other new discoveries in the Texas part of the Marietta-Sherman basin.

2. The discovery and development of the West Chico conglomerate field in Wise County has been the most important factor in stimulating activity in that area. At the close of the year, 24 producing wells had been completed in this and the adjacent Chico field. Discoveries and extensions by Grace's Grace No. 1, Grace's Durham and Kempner No. 1, Cox' Rooney No. 1 and Star's Cherryhomes 1-A in eastern Jack County, and by Ross' Ellis No. 1 in central Wise County have further stimulated interest in Pennsylvanian possibilities of the Fort Worth basin. In southern Wise County, the Signal Oil Company's Daly No. 1, discovery of distillate from the Ellenburger, and in northern Parker County, the Ellenburger showing in the Venture Oil Company's Culwell No. 1, have evoked some interest and activity in that part of the basin.

3. The discovery of production in the Swastika (Cisco) sand added a second producing zone to the Round Top field in Fisher County. Development and extension of the field toward the north and east of the Canyon Reef limestone production which was discovered in 1947 had an important bearing on increasing the exploration for reefs along the western edge of the district.

4. The development of multiple producing sands in the Cisco sands in the Bartlett field in southwestern Jones County and the development of the Marble Falls production in the Kirk pool in Comanche County were outstanding among the many small pools which are typical of this district.

5. The North Chalk Hill Strawn sandstone field in central Archer County developed rapidly through 1948 and increased from 10 to 65 producing wells. Interest in fields of this type in the area was further stimulated by the discovery of the Burns-Jones field in the southeast corner of the county.

TABLE I

New Pools and Extensions Discovered in 1948

Map Index	County	Field	Operator	Farm Well No.	Location	Class	Prod. Form.	Depth of Prod. Form.	Total Depth	Pot. BO PD	Method of Explor.
1.	Archer	Regular	Akin & Dimock	J. H. Turbeville I	Sec. 125, Richards A-368	Ext.	Strawn	3874	3874	21	Sub-Seis.
2.	Archer	Burns-Jones	L. T. Burns	W. C. Jones I	Sec. 1840, TE&L	N.F.	Strawn	3223	3227	100	Sub-Seis.
3.	Archer	Burns-Jones	L. T. Burns	W. C. Jones 4	Sec. 1840, TE&L	Ext.	Strawn	3193	3193	133	Sub-Seis.
4.	Archer	E. Burns-Jones	L. T. Burns	W. J. McMurtry I	Sec. 1876, TE&L	NP	Strawn	3002	4200	96	Sub-Seis.
5.	Archer	Burns-Prideaux	L. T. Burns	G. & C. Prideaux I	Sec. 1835, TE&L	NP	Strawn	3178	3178	125	Sub-Seis.
6.	Archer	Burns-Jones	L. T. Burns	J. R. Wilson I	Sec. 1839, TE&L	Ext.	Strawn	3201	3201	125	Sub-Seis.
7.	Archer	Turbeville	T. B. Cochran	J. H. Turbeville I	Blk. 155, R. Carson	Ext.	Cisco	1490	1490	10	Sub.
8.	Archer	Kendall	Cochran & Cain	B. Lowery I-B	Blk. 55, C. R. Harris S/D	Ext.	Cisco	1169	1169	10	Sub.
9.	Archer	Seay	Cochran & Cain	J. J. Wuckewiste I	Blk. 50, C. R. Harris S/D	Ext.	Cisco	1169	1169	10	Sub.
10.	Archer	E. Holliday	Fain & McGaha	W. Ford 3-A	E. H. Fitzgerald A-35	DP	Strawn	4175	4193	99	Sub-Seis.
11.	Archer	King	Fain & McGaha	W. L. King I	Wm. Henry A-163	NP	Strawn	3780	3780	80	Sub-Seis.
12.	Archer	O'Donohoe	Fortex	J. F. O'Donohoe 3	Sec. 11, ATNCL	Ext.	Cisco	1603	1603	55	Sub-Seis.
13.	Archer	Conrady	W. G. Gouchie	H. Conrady 3-A	Lot 23, Blk. 4, Clark & Plumb	NP	Permian	788	788	41	Trend
14.	Archer	Simmons	W. G. Gouchie	A. W. Simmons I	Lot 37, Blk. 5, Clark & Plumb	NP	Permian	892	892	50	Sub.
15.	Archer	Regular	G. Graham	L. F. Wilson I	Sec. 20, H&TC	NP	Strawn	5212	5671	35	Sub.
16.	Archer	Hutchinson	V. I. Grisham	S. Baker I	Sec. 145, Jose Ostane A-333	Ext.	Cisco	1172	1172	24	Sub.
17.	Archer	Regular	J. W. Hastings	W. P. Ferguson 2	Sec. 1, SP RR A-417	NP	Cisco	1775	1775	2	Sub.
18.	Archer	Bell	H. Hölyfield	J. D. Bell 2	Lot 108, Jefferson CSL	Ext.	Permian	675	675	8	Sub.
19.	Archer	Kempner	Hull Oil	R. L. Kempner 11-C	Blk. 65, SP RR A-429	Ext.	Permian	694	694	8	Sub.
20.	Archer	Regular	T. F. Hunter	T. B. Wilson I	Sec. 2, S.P. Ellis A-1020	NP	Miss.	5036	5036	204	Sub.
21.	Archer	S. Burns-Jones	S. D. Johnson	J. L. Prideaux I	Sec. 1868, TE&L	NP	Strawn	3019	3019	74	Sub-Seis.
22.	Archer	Regular	R. C. Lipscomb	L. A. Snider 2	Sec. 2601, TE&L	NP	Canyon	2445	2445	60	Sub-Seis.
23.	Archer	Neale	J. J. Lynn	A. P. Neale I	Sec. 2, A. P. Neale A-848	NP	Miss.	5210	5210	144	Sub-Seis.
24.	Archer	O'Donohoe	J. F. O'Donohoe	J. F. Donohoe I	Blk. 92, SP RR A-1070	Ext.	Cisco	1604	1604	80	Sub.
25.	Archer	Regular	Republic & Fain-McGaha	Priebe I	Sec. 2, Blk. 1, H&TC A-920	NP	Strawn	4704	4755	105	Sub-Seis.
26.	Archer	Regular	Stewart & Grisham	B. Wisdom 2	Jose Ostane Sur.	NP	Cisco	1175	1175	55	Sub.
27.	Archer	Regular	Timberlake & Kelleher	City of Wichita Falls I	Sec. 112, ATNCL	NP	Cisco	1456	1456	52	N. Tech.
28.	Archer	Bloodworth	White & Duncan	J. M. Bloodworth 2	McKinney & Willing A-312	NP	Cisco	1019	1019	45	Sub-Seis.
29.	Archer	Bell	White & Duncan	L. Maxwell 2	BBB&C A-37	Ext.	Cisco	1019	1019	45	Sub.
1.	Brown		Estes	Blair I	J. Dickenson Sur. #10	DP	Bend	2872	3509	70	Sub.
2.	Brown		Twin Oil Corp.	Holt I	J. Padillo Sur. #646	N.F.W.	Bend	2646	2646	1600 MCF	Sub.

TABLE I (Continued)

Map Index	County	Field	Operator	Farm Well No.	Location	Class	Prod. Form.	Depth of Prod. Form.	Total Depth	Pot. B O P D	Method of Explor.
1.	Callahan		Anderson-Pritchard	Windham I	Sec. 369, G. Hancock Sur.	DP	Ellen.	4423	4432	282	Sub.
2.	Callahan	Heyser	Anzac Oil Corp.	Heyser 2	W. A Smith Sur. #219	N.F.W.	Ellen.	3970	3973	98	Surf.
3.	Callahan	Morrisett	Fresno Oil Co.	Morrisett I	Sec. 67, Blk. 14, T&P	N.F.W.	Cisco	1709	1716	62	Surf.
4.	Callahan	Gary	Groebl	Gary I	Anderson Sur. #777	N.F.W.	Bend	3325	3676	124	Sub.
5.	Callahan		Snyder	Gorsuch I	Sec. 1, Blk. D, SP RR	N.F.W.	Cisco	1518	1537	28	Surf.
6.	Callahan	Taylor-Ramsey	Star	Taylor-Ramsey 2	Sec. 319, Blk. 5, SP RR	DP	Ellen.	3927	3953	163	Sub.
7.	Callahan		Texas Co.	Morrison 2	Sec. 315, Blk. 5, SP RR	N.F.W.	Permian	607	607	1787 MCF	Sub.
8.	Callahan	Milliorn	Ungren-Frazier	Milliorn 1	Sec. 20, BBB&C	N.F.W.	Permian	1320	1330	216	Surf.
1.	Clay	Edrington	Bridwell	H. Edrington I-A	Grassmeyer A-894	NP	Cisco	1310	2185	Gas Plg.	Sub-Seis.
2.	Clay	Edrington	Bridwell	Edrington 21	Sec. 35, HT&B A-759	Ext.	Cisco	1107	1109	10	Sub.
3.	Clay	Joy	L. T. Burns	M. R. Gilbert 2	C. Thompson A-445	Ext.	Strawn	4448	4448	102	OWDD
4.	Clay	Joy	L. T. Burns	A. R. Seigler I	C. Thompson A-445	Ext.	Strawn	4444	4460	20	Sub-Seis.
5.	Clay	Joy	E. B. Clark	E. Childs I	Blk. 24, J. H. Belcher	Ext.	Strawn	4959	4961	10	Sub.
6.	Clay	Regular	Continental	G. W. Scaling 3	Sec. 15, HT&B A-217	NP	Strawn	5527	5527	472	Sub-Seis.
7.	Clay	Regular	Grace & Grace	M. F. Greer I	Lot 39, Grayson CSL	NF	Strawn	5752	6292	20	Sub-Seis.
8.	Clay	Regular	Grace & Grace	Otis Smith I	H. Tucker A-662	NF	Strawn	5470	5515	1112	Sub-Seis.
9.	Clay	Acme	S. D. Johnson	W. I. Holt I	T. Morehead A-310	Ext.	Miss.	5814	5846	200	Seis.
10.	Clay	N.W.Acme	S. D. Johnson	G. W. Scaling I	Sec. 3, HT&B A-211	NP	Ellen.	5836	5838	1383	Sub-Seis.
11.	Clay	Antelope	R. R. Kolp	L. S. Wright I	Sec. 2632, TE&L	Ext.	Cisco	870	870	10	Sub.
12.	Clay	Jolly	Star Oil	A. T. Morris I-B	A. Graham A-757	Ext.	Strawn	4820	4841	138	Sub-Seis.
13.	Clay	Jolly	Star Oil	O. O. Ross 2-A	W. Walker Sur.	DP	Ellen.	5622	5635	86	Sub-Seis.
14.	Clay	Acme	Superior	F. Wines 2	T. Morehead A-310	DP	Miss.	5780	5867	370	Sub-Seis.
15.	Clay	Regular	Wichita River	B. Edwards I	S. C. Beldon A-12	NP	Strawn	4114	6316	169	Sub.
1.	Coleman	Rockcrusher	Rhodes	Deleny I	Sec. 25, BBB&C	N.F.W.	Strawn	2891	3036	40	Surf. & Sub.
1.	Comanche		Coats & Foster	Scott I	Wm. McClelland Sur. A-642	N.F.W.	Ellen.	3526	4302	10	Sub.
2.	Comanche	Kirk	Kirk	Miears I	W. D. Moss Sur.	Ext.	Bend	2792	2825	308	Sub.
3.	Comanche		Ownby Drlg. Co.	Flatt I	Sec. 39, Blk. 2, H&TC	N.F.W.	Bend	2787	2890	40	Sub.
4.	Comanche		Ownby Drlg. Co.	Lindley I	Sec. 52, Blk. 2, H&TC	N.F.W.	Bend	2843	2901	120	Sub.
5.	Comanche		Star	Anderson I	Sec. 21, D&DA	N.F.W.	Strawn	2546	2850	47	Sub.
1.	Cooke	Rivoire	Atlantic	J. Rivoire I	SA & MG Sur.	N.F.	Penn.	3758	3758	49	Seis.
2.	Cooke	Wilson	Burk Royalty	A. A. Fisher I	J. Hamilton A-489	Ext.	Penn.	3046	3046	81	Sub.
3.	Cooke	Regular	Fair & Scott	P. Rivoire I	T. G. Murphy A-671	NP	Penn.	1932	1932	32	Sub.
4.	Cooke	Woodbine	Harvey	Haynes I	H. Baker A-100	Ext.	Penn.	4287	4815	42	Sub.
5.	Cooke	Regular	P. G. Lake	Pace Bros 2	M. R. Reed A-869	N.F.	Penn.	2688	3003	15	N. Tech.
6.	Cooke	Gainesville	Seitr & Dillard	W. L. Johnson I	J. N. Redman A-874	Ext.	Penn.	1634	3367	52	Sub-Seis.
1.	Eastland		Gamblin	Donoway 2	Sec. 3, BBB&C	N.F.W.	Cisco	403	407	5	Surf.
2.	Eastland	Kliener	Lone Star	Kliener 1-A	Sec. 81, Blk. 4, H&TC	N.F.W.	Ellen.	4000	4105	204	Sub.
1.	Erath		Collins	Smith I	J. B. Smith A-740	N.F.W.	Strawn	2980	3161	30	Sub.

TABLE I (Continued)

Map Index	County	Field	Operator	Farm Well No.	Location	Class	Prod. Form.	Depth of Prod. Form.	Total Depth	Pot. BO PD	Method of Explor.
1.	Fisher	Round Top	General Crude	Jackson I	Sec. 88, Blk. 1, H&TC	NP	Cisco	3913	3930	156	Sub.
2.	Fisher		Humble Oil	Davidson I	Sec. 59, HT&B	N.F.W.	Permian	3163	3177	188	Seis.
3.	Fisher	Longworth	Lion Oil Co.	Hale I	Sec. 27, El Paso CSL	N.F.W.	Cisco	3525	3541	148	Sub.
1.	Haskell	Weinert	British American	Smith I	J. Colston #212	N.F.	Strawn	5337	5712	46	Sub-Seis.
2.	Haskell	Collins	Humphrey	Collins I	B. Brown #157	N.F.	Strawn	4941	5549	44	Seis.
3.	Haskell	Clark	Pan-American	Clark I	C. B. Clough A-463	N.F.	Cisco	2359	3100	44	Seis.
1.	Jack	Kinder	Brazos River	Kinder 3	Jacob Veal A-869	Ext.	Marble Falls	4543	4589	61	Sub.
2.	Jack	Regular	Cox Drlg.	J. T. Rooney I	Sec. 3326, TE&L	NP	Strawn	4602	5724	599	Sub.
3.	Jack	Regular	Davon Oil	W. J. Dees I	G. Taylor A-844	N.F.	Miss.	4990	6480	1500 MCF	Unknown
4.	Jack	S. Grace	Jack Grace	Durham & Kempner I	C. J. C. O'Connor A-454	NP	Strawn	5490	6720	78	Sub-Seis.
5.	Jack	Grace	Jack Grace	Grace Ranch I	C. J. C. O'Connor A-454	NF	Strawn	5375	5375	28	Seis.
6.	Jack	Regular	Star Oil	Cherryhomes I-A	C. J. C. O'Connor A-454	NP	Strawn	5683	5722	4500 MCF	Sub-Seis.
7.	Jack	Bryson	Star Oil	Raley-Henderson I	W. Hill A-1964	Ext.	Strawn	3956	4828	2475 MCF	Sub-Seis.
8.	Jack	Steed-Matlocks	Warren	E. F. Robertson I-B	M. J. Swan A-1630	Ext.	Strawn	4787	4793	24	Seis.
1.	Jones	Largent	Bay & Hilburn	Mathews I	Sec. 149, DeWitt CSL	N.F.W.	Strawn	4642	4657	90	Sub.
2.	Jones	Fragosa	Danciger	Stephenson I	Fragosa Sur. #267	N.F.W.	Cisco	2929	2936	72	Sub.
3.	Jones		Davisson	Ramsey I	Sec. 80, Blk. 14, T&P	N.F.W.	Permian	1698	1701	137	Sub.
4.	Jones	Akens	Geochemical Sur.	Simpson I	Sec. 18, Blk. 16, T&P	N.F.W.	Cisco	2271	2277	119	Sub.
5.	Jones		Hendrick	Connally I	A. W. Hill Sur. #4	N.F.W.	Cisco	1967	1972	104	Sub.
6.	Jones	Alford	Herring	Alford I	Sec. 52, Blk. 2, SP RR	N.F.W.	Cisco	3140	3226	65	Sub.
7.	Jones	Anderson	Herring	Anderson I	Sec. 2, MEP&P	N.F.W.	Cisco	2637	2654	120	Seis.
8.	Jones		Hovgard	Goodwin I	Sec. 14, T&NO	N.F.W.	Cisco	2285	2960	6	Sub.
9.	Jones	Avoca	Humble	Hollums 19	Sec. 190, Blk. 1, BBB&C	DP	Strawn	4609	5208	24	Sub.
10.	Jones	Pittard	Humble	Pittard I	Sec. 4, Blk. 1, T&NO	N.F.W.	Canyon	4310	5522	52	Seis.
11.	Jones	Gray	Humphrey	Gray I	Sec. 25, D&DA	N.F.W.	Cisco	2110	2122	147	Sub-Seis.
12.	Jones		Roberts	Minter 2	Sec. 26, Blk. 15, T&P	N.F.W	Cisco	2465	2490	62	Sub.
13.	Jones	Anson	Robinson-Puckett	Scott I-A	Sec. 14, OAL	N.F.W.	Canyon	3587	3608	196	Sub.
14.	Jones		Robinson-Puckett	Wright I-A	Sec. 15, OAL	N.F.W.	Cisco	2270	2278	78	Sub.
15.	Jones		Sabens	Rutledge I	A. Sieberman Sur. #13	N.F.W.	Permian	1717	1896	22	Sub.
16.	Jones		Stewart	Minter I	Sec. 42, Blk. 15, T&P	N.F.W.	Permian	2025	2032	352	Sub.
17.	Jones		Texas	Merritt I	Sec. 44, Blk. 18, T&P	N.F.W.	Strawn	4632	5408	42	Sub.
1.	Montague	Barrett	L. W. Barrett	McCull-Fooshee I	J. G. Cox A-163	NP	Strawn	6426	6700	50	N. Tech.
2.	Montague	Minor	Continental	J. H. Jameson I	J. Winn A-868	Ext.	Strawn	6392	6485	168	Seis.
3.	Montague	Regular	Continental	S. W. Kennedy I	Sec. 27, ET RR A-240	NP	Strawn	6265	6626	464	Seis.

TABLE I (Continued)

Map Index	County	Field	Operator	Farm Well No.	Location	Class	Prod. Form.	Depth of Prod. Form.	Total Depth	Pot. B O P D	Method of Explor.
4.	Montague	W. Stoneburg	Continental	C. P. Miller I	Sec. 21, Limestone CSL	N.F.	Strawn	6204	6344	684	Seis.
5.	Montague	Regular	Continental	H. A. Richardson I	Lot 79, Titus CSL	NP	Strawn	6071	6570	1000	Seis.
6.	Montague	Staley	Continental	L. M. Staley I	R. Crawford A-148	N.F.	Strawn	5980	6107	118	Seis.
7.	Montague	Regular	A. R. Dillard	H. G. Walker I	Sec. 18, Limestone CSL	NP	Strawn	4972	6470	191	Sub.
8.	Montague	Regular	Kingery	Ructashel I	Sam Little A-417	NP	Canyon	858	858	18	Trend
9.	Montague	Stansall	R. Maguire	B. Stansall I	Sec. 70, Wm. Ainsworth	NP	Strawn	5405	5764	92	Sub-Seis.
10.	Montague	Stewart	R. Maguire	Stewart I	Sec. 19, J. Y. Castello	NP	Strawn	5358	5372	1140	Sub-Seis.
11.	Montague	Gronow	Sinclair Prairie	M. Gronow I	L. F. Fisch A-283	N.F.	Strawn	4094	6490	127	Seis.
12.	Montague	Minor	Sinclair Prairie	W. T. Minor I-A	C. C. Milne A-485	N.F.	Strawn	6244	6430	2732	Seis.
13.	Montague	Bower	Texas Co.	W. O. Childress 2	T. Puckell A-595	Ext.	Strawn	2523	3729	144	Sub-Seis.
14.	Montague	S. Stoneburg	R. B. Thrift	J. H. Cross I	Sec. 16, Limestone CSL	NP	Strawn	6168	6209	1590	Seis.
1.	Nolan		Sohio	Favor I	Sec. 50, Blk. 21, T&P	DP	Ellen.	5671	6193	183	Sub.
1.	Palo Pinto		Crader	Costello I	M. Castleman A-119	N.F.W.	Strawn	1500	1543	1552 MCF	Sub.
2.	Palo Pinto	Posidian	F.O.B. Oil Co.	Cantey I	Sec.25, Blk. 3, T&P	N.F.W.	Ellen.	4293	4310	96	Sub-Seis.
1.	Runnels		Geochemical Sur.	Freeman I	T. R. Webb Sur. #357	N.F.W.	Canyon	3390	3405	48	Surf-Sub.
2.	Runnels	Beddo	Groebel	Beddo I-A	G. W. Dyer Sur.	DP	Strawn	3817	3837	256	Sub.
3.	Runnels		Pan-American	Campbell I	J. Bays Sur. #530	N.F.W.	Strawn	3536	4590	8	Sub-Seis-Surf.
1.	Shackelford	Big West-Nail	Big West	Nail 14-B I	Sec. 68, ET RR	N.F.W.	Bend	4925	5366	283	Sub-Surf.
2.	Shackelford		Big West	Nail 12-E I	Sec. 80, ET RR	N.F.W.	Permian	1112	5318	27	Sub-Surf.
3.	Shackelford	Double D	Kadane-Griffin	Davis I	Sec. 1546, TE&L	N.F.W.	Ellen.	4430	4446	556	Surf.
4.	Shackelford	Pittman-Reynolds	McElroy Ranch	Pittman-Reynolds I	Sec. 2, Blk. 11, T&P	N.F.W.	Ellen.	4533	4538	764	Sub-Seis.
5.	Shackelford	Partney	Mitchell	Partney I	Sec. 17, BAL	N.F.W.	Strawn	4322	4620	278	Sub-Seis.
6.	Shackelford	Flatrock Creek	Oil Well Drlg.Co.	Davis I	Sec. 36, Blk. 12, T&P	N.F.W.	Ellen.	4696	4715	324	Sub-Seis.
7.	Shackelford	Schwab-Nail	Schwab	Nail I	Sec. 123, ET RR	N.F.W.	Strawn	4954	5302	187	Sub.
8.	Shackelford	Rae	Snowden	Elliott I	Sec. 26, BOA	N.F.W.	Ellen..	4292	4431	70	Sub.
9.	Shackelford		Winn	Ruff I	Sec. 21, Blk. 11, T&P	N.F.W.	Permian	825	830	5	Surf.
1.	Stephens		Andrews	Repass I	TE&L, A-380	N.F.W.	Bend	4080	4701	8500MCF	Sub.
2.	Stephens		Baker	Harrison I	Sec. 1407, TE&L	Ext.	Miss.	4037	4053	42	Sub.
3.	Stephens		Snowden	West I	Sec. 11, Blk. 3, SP RR	N.F.W.	Strawn	3256	4585	16	Sub-Seis.
4.	Stephens	Star-Allar	Star Oil Co.	Allar I-A	BB. Stancell A-157	N.F.W.	Bend	4328	4861	13800MCF	Sub-Seis.
5.	Stephens	Texas-Moon	Texas	Moon I	Sec. 1306, TE&L	N.F.W.	Miss.	4130	4876	1100MCF	Seis.
6.	Stephens		T&P C & O	Trammell I	Sec. 42, Blk. 8, T&P	N.F.W.	Miss.	4127	4415	4200 MCF	Sub-Seis.
7.	Stephens	Crystal Falls	T&P C & O	TXL I-B	Sec. 1, Blk. 5, T&P	N.F.W.	Strawn	3415	4535	535	Seis.
8.	Stephens	Whonose	T&P C & O	TXL 2-B	Sec. 7, Blk. 5, T&P	N.F.W.	Miss.	4282	4675	960	Seis.
1.	Taylor	Bird	Geochemical & Twin Oil Co.	Bird I	Sec. 147, Grimes CSL	N.F.W.	Permian	2197	2234	912	Sub.

TABLE I (continued)

Map Index	COUNTY	Field	Operator	Farm Well No.	Location	Class	Prod. Form.	Depth of Prod. Form	Total Depth	Pot. BOPD	Method of Explor.
2.	Taylor	Gibson	Geochemical Sur.	Moore I	Sec. 147, Crimes CSL	N.F.W.	Cisco	2552	2868	92	Sub.
3.	Taylor		West Central	Reidenbach I	Sec. 146, Grimes CSL	N.F.W.	Cisco	2498	3064	640	Sub.
4.	Taylor		West Central	Smith I	Sec. 146, Grimes CSL	N.F.W.	Permian	2725	2734	91	Sub.
1.	Throckmorton	E. Andrews	Deep Rock	Andrews I	Sec. 284, BBB&C	N.F.	Marble Falls	4779	4860	28	Seis.
2.	Throckmorton	Morrison	Grisham	Morrison I	Sec. 1193, TE&L	N.F.	Strawn	3935	3935	75	Seis.
3.	Throckmorton	Regular	Grisham-Hunter	Brown 5	Sec. 1613, TE&L	DP	Miss.	4676	4676	95	Seis.
4.	Throckmorton	Regular	Le Sage	McKeichan I	C.I,R. Sec. 4	N.F.	Miss.	4509	4509	140	Seis.
5.	Throckmorton	Atkinson	Manning	Atkinson I-H	Stiles & Buchanan	N.F.	Miss.	4755	4755	160	Seis.
6.	Throckmorton	M&B	Manning	Brown I-P	B. Garner	N.F.	Strawn	4533	4739	125	Seis.
7.	Throckmorton	Regular	Manning	Cathey Unit I	BBB&C, Sec. 225	N.F.	Miss.	4990	4990	28	Seis.
8.	Throckmorton	Regular	Manning	Davis-Condron I	Sec. 1620, TE&L	N.F.	Strawn	4180	4823	28	Seis.
9.	Throckmorton	S.B.P.J.	Manning	Cober 3	Sec. 3, D.L. & C.	NP	Marble Falls	4722	4913	165	Seis.
10.	Throckmorton	Regular	Manning	Harrington-Manning-I	Sec. 230, BBB&C	N.F.	Strawn	3926	3926	165	Seis.
11.	Throckmorton	King-Caddo	Manning	King I	Sec. 268, BBB&C	N.F.	Strawn	4710	5240	192	Seis.
12.	Throckmorton	Watt	Manning	Watt 2	E. Dean #855	N.F.	Strawn	4554	5175	84	Seis.
13.	Throckmorton	Regular	Smith	List I	Sec. 2330, TE&L	N.F.	Miss.	4670	4670	14	Seis.
14.	Throckmorton	Marrs	Snowden	Marrs I	Sec. 289, BBB&C	N.F.	Penn.	4770	4889	67	Sub-Seis.
15.	Throckmorton	Wright	Snowden	Wright I	Sec. 294, BBB&C	N.F.	Miss.	4780	4780	144	Sub-Seis.
16.	Throckmorton	Davis	Warren	Davis I	Sec. 163, BBB&C	N.F.	Strawn	4740	5232	66	Seis.
17.	Throckmorton	Dickie	Woodley	Dickie I	Sec. 938, TE&L	N.F.	Strawn	4190	4700	107	Seis.
18.	Throckmorton	E. Black Creek	Woodley	Hughes I	Sec. 902, TE&L	DP	Miss.	4500	4500	341	Sub-Seis.
1.	Wichita	Regular	Akin & Dimock	C. Birk I	Blk. 15, Cowherd Bros. S/D	Ext.	Strawn	4152	4162	144	Sub-Seis.
2.	Wichita	Electra	A. E. Blair	P. A. McIntosh I	Sec. 10, HT&B A-401	Ext.	Cisco	1986	1986	10	Sub.
3.	Wichita	Norwood	Consolidated	J. H. Norwood I	Lot 35, Palo Pinto CSL	NP	Strawn	4140	4150	816	Sub-Seis.
4.	Wichita	Hausler	Continental	Hausler	J. Pike A-509	N.F.	Simpson	5698	6008	181	Seis.
5.	Wichita	Ramming	Fortex	J. L. Jackson I	G. Wheelwright	NP	Cisco	1278	1278	15	Sub-Seis.
6.	Wichita	K.M.A.	H. Crace	T. J. Pace I	W. Graves A-81	Ext.	Strawn	4096	4096	177	Sub-Seis.
7.	Wichita	N. W. Burkburnett	G. Graham	J. Slama 3	Blk. 59, R.R.V.L	Ext.	Cisco	1904	1096	11	Sub.
8.	Wichita	Regular	W. E. Hammon	G. M. Thaxton I	Blk. 40, Cherokee CSL	N.F.	Strawn	4466	4477	10	Sub.
9.	Wichita	Cole	Hammon & Warren	T. J. Cole 2-A	Blk. 10, Cowherd Bros. S/D	SP	Canyon	2952	2964	1487	Sub-Seis.
10.	Wichita	K.M.A.	Le Bus	Hodges I-A	H. B. Balch A-26	DP	Ellen.	4306	4306	938	Sub-Seis.
11.	Wichita	K.M.A.	Nat. Coop.	Bishop I	Neatherly A-240	Ext.	Strawn	4043	4043	165	Sub.
12.	Wichita	Clara	Staley	J. E. Roller I	Sec. 3, CT RR A-50	Ext.	Permian	624	627	10	Sub.

TABLE I (Continued)

Map Index	County	Field	Operator	Farm Well No.	Location	Class	Prod. Form.	Depth of Prod. Form.	Total Depth	Pot. BOPD	Method of Explor.
1.	Wilbarger	Harrold	Big Six	J. H. Orr 3	Sec. 2, Blk. 14, H&TC	Ext.	Canyon	3202	3688	13	Sub-Seis.
2.	Wilbarger	Odell	Humble	Morgan-Berry 4	Sec. 5, Blk. 11, H&TC	DP	Ellen.	6572	6572	216	Sub-Seis.
3.	Wilbarger	W. Odell	Nat. Assoc.	D. E. Davis I	Sec. 3, Blk. 10, H&TC	NP	Canyon	4774	6836	177	Sub-Seis.
1.	Wise	W. Chico	Kingwood	Garret I	C. W. Egery A-268	NP	Strawn	5338	5400	260 mcf	Seis.
2.	Wise	Cottondale	Signal	Daly I	Cunningham A-1119	N.F.	Ellen.	6565	6819	4019 174 B. Dist.	Sub-Seis.
1.	Young	Regular	American Rep.	R. B. Jones I	Sec. 1648, TE&L	NP	Strawn	3735	3829	174	Sub-Seis.
2.	Young	Welch	Armour Prop.	Carmack I	Lot 16, Young CSL	Ext.	Strawn	3694	3713	72	Sub.
3.	Young	Knox	C. B. Christie	M. K. Graham I-A	J. Poitevant A-227	Ext.	Strawn	3115	3115	1000-30BO	Sub.
4.	Young	Garvey	H. D. Egger	B. W. King 3	W. Nicholson	Ext.	Strawn	3534	3534	149	Sub.
5.	Young	Regular	Goodstein & Gordon	J. M. Golden I	Young CSL A-1285	NP	Strawn	2610	3736	35	Seis.
6.	Young	S. Rathke	J. A. Green	Laquey I	W. Kelly A-1698	DP	Miss.	4492	4496	61	Sub.
7.	Young	Oates	Hanlon-Boyle	F. D. Oates I	Sec. 1672, TE&L	NP	Strawn	2912	2912	202	Sub-Seis.
8.	Young	Prideaux	Howell & Howell	Prideaux I	A. McMullen A-198	DP	Strawn	2985	2985	147	Sub.
9.	Young	Regular	Humble	W. D. Daws I-B	Sec. 770, TE&L	NP	Strawn	4371	5138	57	Sub-Seis.
10.	Young	Gambrell	Hunter	E. Wiechman I	Sec. 173, TE&L	NP	Strawn	4355	4369	216	Sub.
11.	Young	Fish Creek	King	Griffin I-A	W. Bellonmy A-2131	Ext.	Strawn	2390	2390	72	Sub.
12.	Young	Herron City	R. H. King	Henderson I	J. H. Hill A-127	Ext.	Strawn	2463	2463	5	Sub.
13.	Young	Bunger	A. Knappenberger	A. P. Pugh I	Sec. 14, Brazos Riv.	Ext.	Strawn	4026	4130	137	Sub.
14.	Young	Regular	R. C. Lipscomb	Furr & Allar I	Sec. 316, TE&L	NP	Miss.	4770	4770	231	Seis.
15.	Young	Regular	Lipscomb & Delange	W. T. Swink I-A	Sec. 301, TE&L	N.F.	Miss.	4987	4987	118	Seis.
16.	Young	Olney	Moco & Nu-Enamel	G. D. Ruthell I	Sec. 217, TE&L	Ext.	Cisco	962	962	7	Sub-Seis.
17.	Young	Brundig	J. McLester	Akers I	W. McClure A-183	DP	Miss.	4425	4425	5000 MCF	Sub.
18.	Young	James	Oil Well Drlg.	Mobley I	Sec. 459, TE&L	Ext.	Miss.	4792	4792	110	Sub.
19.	Young	Belknap	B. Rankin	Clark Est. I	C. Newhaus A-2206	Ext.	Strawn	3992	4444	30	Sub.
20.	Young	Campbell	Reno	R. Campbell I-C	Sec. 1463, TE&L	Ext.	Cisco	948	948	114	Sub-Seis.
21.	Young	Markley	Reno	G. P. Stewart 117	Lot 7, Young CSL	Ext.	Cisco	595	595	6	Sub-Seis.
22.	Young	Knox	Star & Rankin	E.T. Slater I-B	Sec. 464, TE&L	Ext.	Miss.	4790	4790	7	Sub-Seis.
23.	Young	S. Murray	Warren	Allar Co. I-K	Sec. 1653, TE&L	NP	Strawn	3639	3639	174	Sub-Seis.
24.	Young	Regular	Warren	R. T. Sweeney I-B	Sec. 2379, TE&L	N.F.	Strawn	4311	4311	251	Sub-Seis.
25.	Young	Knox	Warren & Rankin	A. D. Moore I	E. L. Douglas A-2157	Ext.	Strawn	4603	5062	77	Sub-Seis.
26.	Young	Padgitt	Wendell	B. Davis I	Sec. 66, TE&L	Ext.	Cisco	1093	1093	2	Sub.

6. The discovery and development of small Caddo and Mississippian limestone fields continued at a steady pace for the third consecutive year in Throckmorton County largely as a result of intense seismic exploration. Several of these wells have also encountered profitable producing zones in various Strawn sands.

7. The increased amount of leasing and geophysical activity which was undertaken around Coryell, Bosque, Hamilton, and Erath counties was largely responsible for maintaining more interest in the eastern part of the district than in previous years.

8. The success of the Diamond core drill in coring reef-type limestone in this area promises to become an important source of geological information for the further development of these reservoirs.

Of the 202 new producing discoveries and extensions in 1948, 15 produced from the Permian, 38 from the Cisco, 8 from the Canyon, 83 from the Strawn, 12 from the Bend, 22 from the Mississippian, 1 from the Simpson, and 16 from the Ellenburger. Seven produced from the Pennsylvanian but are undifferentiated in age.

Subsurface surveys were the leading exploratory method with 81 discoveries to its credit. The seismograph used independently was credited with 40 discoveries, and, combined with subsurface information, accounted for 62 additional discoveries. It may be true that in many cases where one method has been credited with the discovery, a combination of methods was used. In several instances surface work, subsurface, and seismograph were probably combined to locate the discovery well.

The number and types of geophysical methods active in the district are indicated by the following table which shows an increase of 36 per cent in the number of active crews at the end of the year as compared with the end of 1947.

Date	*Seis.*	*Grav.*	*Core Drill*	*Mag.*	*Total*
1948					
Jan. 1	50	16	8	0	74
July 1	68	14	3	3	88
Dec. 31	68	15	15	3	101

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VOL. 33, NO. 6 (JUNE, 1949), PP. 945-955, 2 FIGS., 1 TABLE

DEVELOPMENTS IN SOUTH TEXAS IN 1948[1]

BRUCE SCRAFFORD[2]
San Antonio, Texas

ABSTRACT

The development in South Texas during 1948 showed a 23 per cent increase over the previous year. In all 2,987 tests, 2,158 wells in proved areas and 829 wildcat wells, were drilled and resulted in 1,915 successful completions. The exploratory development resulted in the discovery of 81 producing reservoirs in 79 new areas, 3 of the discovery wells being dual completions. The most important of the new discoveries are the Doering Ranch field in Frio County, the Holly field in DeWitt County, the South Long Horn field in Duval County, the San Pablo field in Jim Hogg County, the Quien Sabe field in Webb County, the East Long Mott field in Calhoun County, and the Sarita field in Kenedy County. Wells drilled in productive areas uncovered 155 new producing beds in 84 fields, the Frio-Vicksburg trend accounting for 108 of the total. At the close of 1948 oil wells totaling 16,738 had produced 169,739,954 barrels of oil, 10 per cent more than had been produced from the area during the previous year. Thirty-six per cent of the oil wells in the South Texas district are now being serviced for casinghead gas.

INTRODUCTION

The South Texas district is that area referred to by the Railroad Commission of Texas, Oil and Gas Division, as districts 1, 2, and 4, with the omission of Mason County on the northwest and the addition of Burleson, Lee, and Fayette counties on the northeast. The area, which embraces 61 counties in all, is shown on Figure 1.

For convenience of discussion, because of the large size of the South Texas district, development in this area has been subdivided into stratigraphic divisions based on the geologic age of the production trends. These subdivisions are as follows: (1) the pre-Cretaceous of the Edwards Plateau; (2) the Cretaceous; (3) the Queen City, Reklaw, and Carrizo-Wilcox of the lower Eocene; (4) the Jackson and Yegua of the upper Eocene; (5) the Frio and Vicksburg of the lower Oligocene; and (6) the Oakville and Catahoula of the upper Oligocene and lower Miocene.

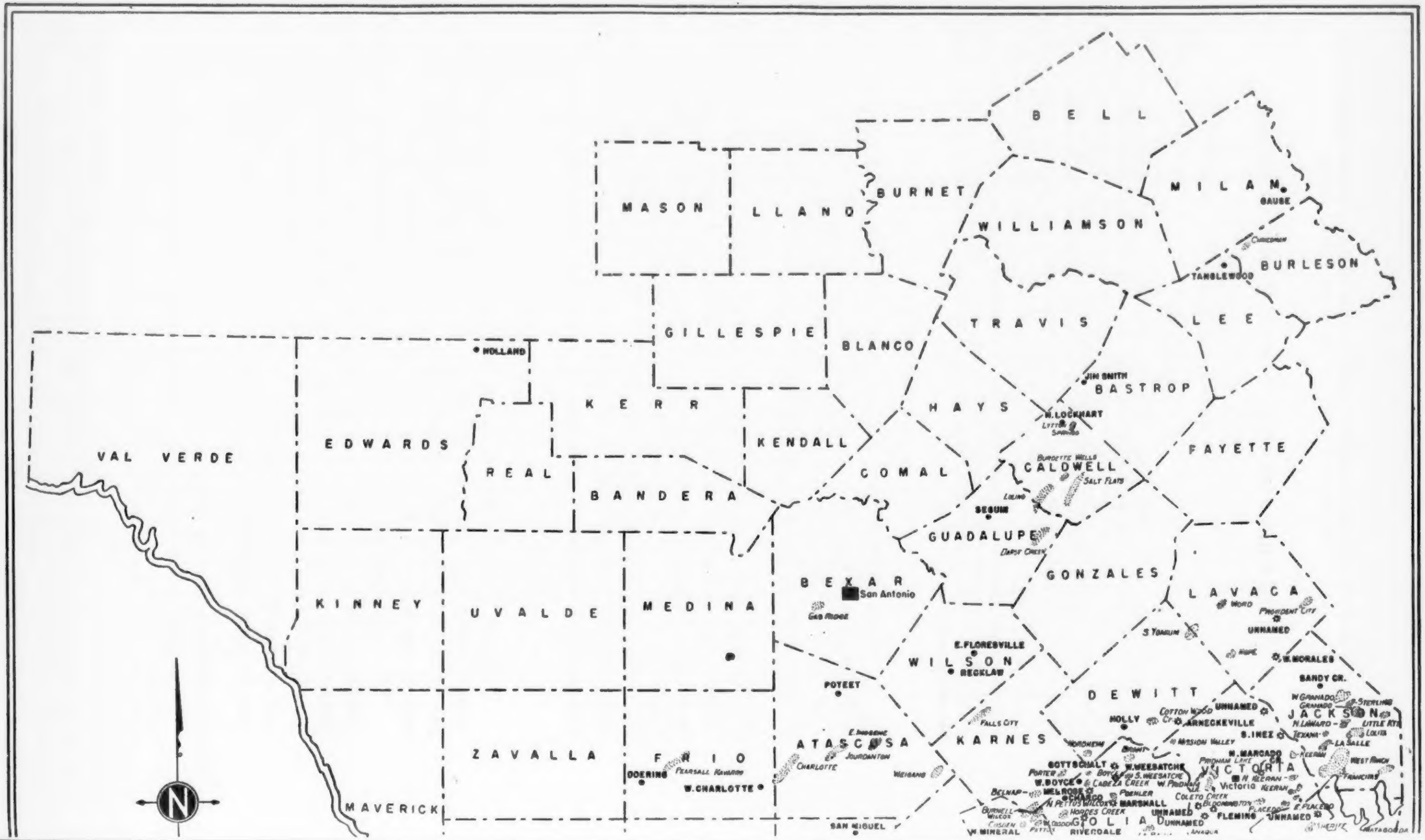
DEVELOPMENT

The rate of development in the South Texas district continued on the increase during 1948 and resulted in the drilling of 2,987 wells of all categories, 601 more wells than were drilled during 1947. Of the total wells drilled, 2,158 were in proved areas while 829 were classified as wildcat wells.

The 2,158 field wells, drilled in 323 separate producing areas, resulted in the completion of 1,591 oil and 243 gas producers; 93 of the wells were dually completed. Twenty-three per cent of the wells drilled in proved areas were abandoned. While the rate of development in proved areas during 1948 accounted for 400 more wells than were drilled in known productive areas during the previous year the percentage of successful completions showed a decline of 4 per cent.

[1] Manuscript received, March 21, 1949.

[2] Consulting geologist, 1610 Alamo National Building. Assistance of the following in checking the accuracy of development is hereby acknowledged: James K. Rogers; Arkansas Fuel Oil Company; C. H. Row; Martin Russo; and W. N. Chaddick, Jr., of the Sun Oil Company.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BLANCO
HOLLAND
JIM SMITH
BASTROP
KERR
HAYS
N. LOCKHART
EDWARDS
REAL
KENDALL
FAYETTE
VAL VERDE
COMAL
CALDWELL
BANDERA
SEGUIN
GUADALUPE
BEXAR
San Antonio
GONZALES
LAVACA
UNNAMED
KINNEY
UVALDE
MEDINA
E. FLORESVILLE
WILSON
RECKLAW
POTEET
DEWITT
SANDY CR.
JACKSON
HOLLY
ARNECKEVILLE
S. INEZ
ZAVALLA
FRIO
ATASCOSA
KARNES
VICTORIA
Victoria
DOERING
W. CHARLOTTE
GOTTSCHALT
W. WEESATCHE
W. BOYCE
MARSHALL
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MAVERICK
SAN MIGUEL
GOLIAD
W. MINERAL
RIVERDALE

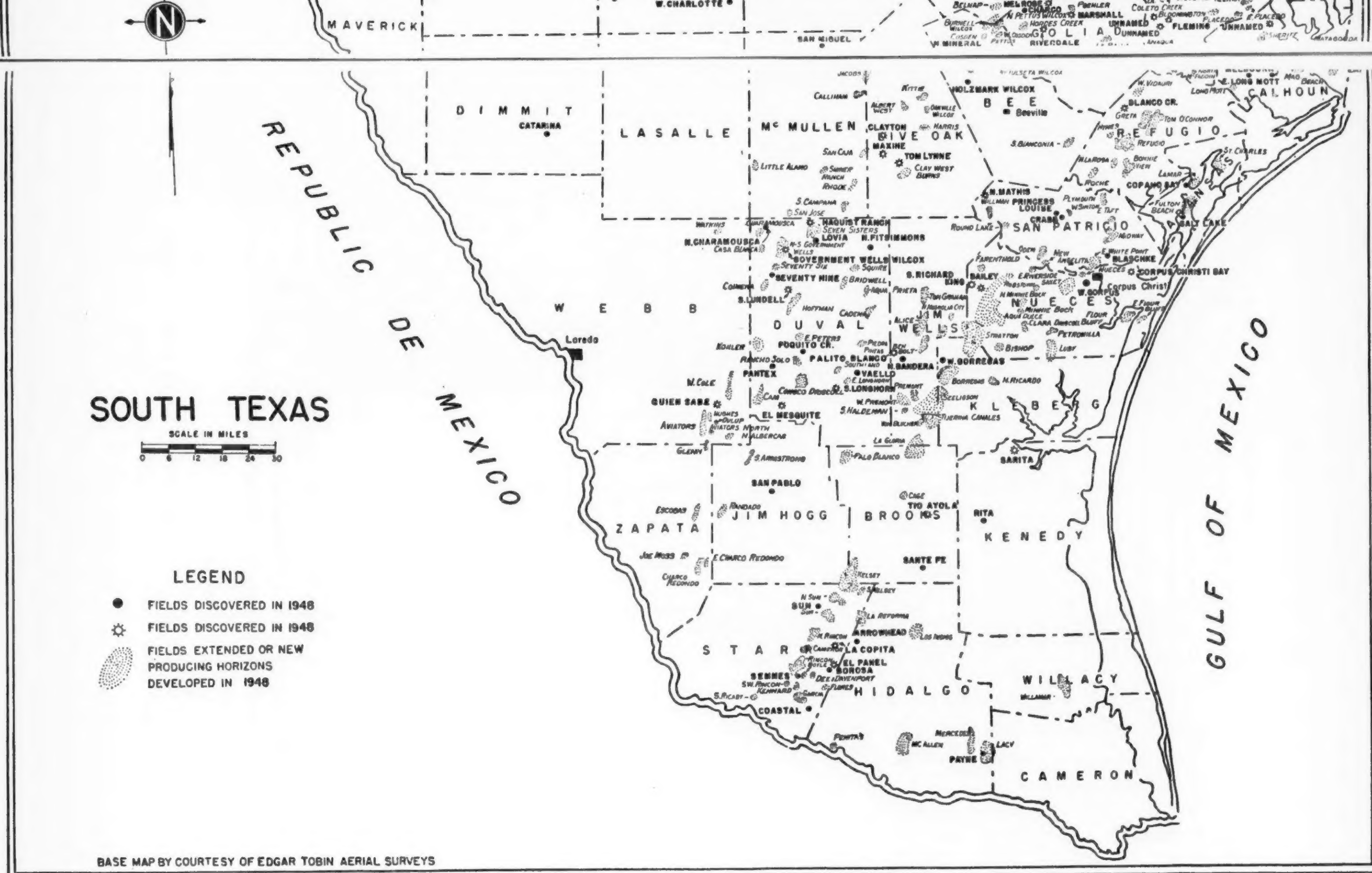

SOUTH TEXAS
SCALE IN MILES
0 6 12 18 24 30
LEGEND
FIELDS DISCOVERED IN 1948
FIELDS DISCOVERED IN 1948
FIELDS EXTENDED OR NEW PRODUCING HORIZONS DEVELOPED IN 1948
REPUBLIC DE MEXICO
GULF OF MEXICO
MAVERICK
DIMMIT
CATARINA
LASALLE
Mc MULLEN
LIVE OAK
BEE
Beeville
REFUGIO
CALHOUN
SAN PATRICIO
NUECES
Corpus Christi
CORPUS CHRISTI BAY
WEBB
Laredo
DUVAL
JIM WELLS
KLEBERG
ZAPATA
JIM HOGG
BROOKS
KENEDY
STARR
HIDALGO
WILLACY
CAMERON
SAN MIGUEL
W. CHARLOTTE
SAN PABLO
SARITA
RITA
SANTE FE
COASTAL
TOM LYNNE
MAXINE
CLAYTON
HOLZMARK WILCOX
LOVIA
N. FITSIMMONS
GOVERNMENT WELLS WILCOX
SEVENTY NINE
S. LUNDELL
PALITO BLANCO
POQUITO CR.
PANTEX
EL MESQUITE
QUIEN SABE
N. BANDERA
W. CORREGAS
VAELLO
S. LONGHORN
TIO AYOLA
SUN
ARROWHEAD
LA COPITA
EL PANEL
BOROSA
SENNES
PAYNE
LACY
BASE MAP BY COURTESY OF EDGAR TOBIN AERIAL SURVEYS

Fig. 1

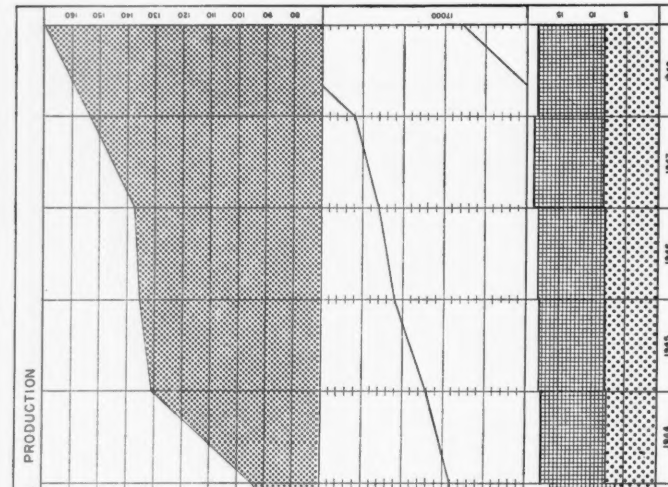

SOUTH TEXAS OIL PRODUCTION
MILLIONS OF BARRELS – OIL
NUMBER PRODUCING OIL WELLS
PERCENT PRODUCTION
TEXAS
U.S.
YEAR
1939
1940
1941
1942
1943
1944
1945
1946
1947
1948

FIG. 2

The 829 wildcats wells, 57 per cent more than were drilled during the previous year, resulted in the discovery of 78 new producing areas. Only 9.4 per cent of the wildcat wells, as compared with 12.3 per cent for 1947, were successfully completed. Three of the discovery wells were dually completed, thus bringing to 81 the number of new producing reservoirs found by wildcat drilling. By the end of the year 243 additional wells had been drilled in the vicinity of the new discoveries; 170 being completed as oil producers, 29 as gas condensate wells, and the remaining 54 wells were abandoned. The total oil production for the month of December from the fields found during 1948 amounted to 307,635 barrels.

The following is a summary tabulation of the exploratory development and results obtained in the six South Texas geological provinces. The totals of productive wells reflects the three dually completed wells.

Geologic Province	*Discovery Wells*		*Abandoned Wells*	*Total Wells*
	Oil	*Gas*		
Pre-Cretaceous	—	—	1	1
Cretaceous	10	—	193	203
Lower Eocene	6	12	78	96
Upper Eocene	12	5	228	245
Lower Oligocene	16	16	235	267
U. Oligocene and L. Miocene	1	3	13	17
Totals	45	36	748	829

A survey of prospecting methods utilized in locating the successful wildcat tests accredits seismograph surveys as the basis of 41 discoveries; subsurface geology for 28; and a combination of seismograph and subsurface geology for 6 new fields. The remaining 3 discoveries were found as a result of surface geology, core drilling, or by gravity-meter survey.

The location of the discoveries for 1948, as well as the fields extended and fields in which new producing beds were encountered, are shown on Figure 1. Table I lists the pertinent data relative to the discovery wells.

NEW PRODUCING ZONES IN PROVED AREAS

The new producing zones, which continue to be uncovered in the multiple-reservoir fields of South Texas, are of major reserve importance. In all, 155 new pools, 90 oil and 65 gas, were found in 84 fields. The fields producing from Frio-Vicksburg sands, lower Oligocene trend, accounted for 108 of the new pools. The Kelsey field, in Brooks, Starr, and Jim Hogg counties, discovered in 1938, accounted for 15 new pools during 1947 and an additional 8 new producing reservoirs for the year 1948. The initial discovery well of a lower Oligocene trend field does not ordinarily reflect the true reserve significance of the field.

PRODUCTION

Figure 2 shows the trend of oil production in the South Texas district, the number of producing oil wells and production percentage comparisons with the

TABLE 1

SOUTH TEXAS FIELDS DISCOVERED IN 1948

County & Field	Discovery Well: Operator	Discovery Well: Fee	Survey	Completion Date 1948	Total Depth Feet	Type Well	Producing Depth Feet	Initial Production Test	Formation	Trend
Aransas										
Copano Bay	Phillips Pet.Co.	State Tract 34 # 1	State Tract # 34	Aug. 25	9512	oil	7143-48	164 BOPD 41.5 gr., 1/8" Ch.	Frio	L. Oligocene
Salt Lake	Atlantic Ref. Co.	V. G. Gwynn # 1	Joseph Hollis A-76	Dec. 2	10,000	oil	7209-14	41.4 BOPD(23%SW) 9/64" Ch.	Frio	L. Oligocene
Atascosa										
Poteet	McFarland Drlg. Co.	Henrietta Krisch#2	#1207	Dec. 8	3612	oil	3562-3612	127.5 BOPD 41.4 gr.,1/4" Ch.	Anacacho	Cretaceous
Bastrop										
Jim Smith	James E. Smith	T. J. Caldwell #1	Jose A. Navarro Gr., A-53	April 21	1647	oil	1608-47	30.9 BOPD Pump	Serpentine & Austin Chalk	Cretaceous
Bee										
Holzmark-Wilcox	Gasoline Prod.Corp.	Holzmark Est. #1	Thos. P. Rhodes A-397	June 18	8130	oil	8108-14	107.64 BOPD 27.6 gr., 5/32"Ch.	Wilcox	L. Eocene
Mineral, North	Rudco Oil & Gas,et al.	C. P. Sparkman #2	Asa Walker	Nov. 7	7608	Gas-dist.	7554-62	20,000 MCFG,Open Flow	Wilcox	L. Eocene
Brooks										
Santa Fe	Humble Oil & Ref. Co.	Santa Fe Ranch #1	San Salvador de Tule	Dec. 24	9006	oil	3237-42	21.6 BOPD 34 gr., 1/8"Ch.	Oakville	Miocene
Tio Ayola	Humble Oil & Ref.Co.	Robt. J.Kleberg,Jr.#2	La Noria de Tio Ayola	Dec. 20	7923	gas	1860-70	2,200 MCFG open flow	Oakville	Miocene
Caldwell										
Lockhart,North	Wiegang Brothers	Pat King #1	Sampson Connell	Oct. 21	1588	oil	1453-1588	8 BOPD Pump	Austin Chalk	Cretaceous
Calhoun										
Long Mott, East	C. C. Glasscock & Pontiac Refg. Co.	T. A. McDonald #1	I.& G.N. #6 A-95	Feb. 2	7304	oil	7268-69	112.3 BOPD 41.2 gr.,1/8"Ch.	Frio	L.Oligocene
Melbourn	Southern Prod.Co.Inc.	W. C. Melbourne #1	Benito Morales A-28	Dec. 12	10,009	oil	8587-97	134.4 BOPD 40 gr.,12/64"Ch.	Frio	L. Oligocene
(Unnamed)	Quintana Pet. Co.	Willet Wilson #1	Y. Benavides Gr.	Oct. 28	9680	Gas-dist.	8834-40	86,000 MCFG open flow	Frio	L. Oligocene
DeWitt										
Arneckeville	Western Natural Gas Company	Ed. Zengerlie #1	James Quinn A-395	Nov. 5	8711	Gas-dist.	8158-68	3,000 MCFG, 1/4" Ch.	Wilcox	L. Eocene
Holly	Holly Dev. Co.	George Stanchos #1	James Kelly A-285	Jan. 31	7615	oil	7610-13	165 BOPD 35.2 gr.,1/8" Ch.	Wilcox	L. Eocene
Dimmitt										
Catarina	Henderson Coquat & Algord Company	H. A. Dillon #1	G. W. T. & P. #41	Oct. 21	5210	oil	4890-4932	20 BOPD Pump	Navarro	Cretaceous
Duval										
Charamousca,North	Magnolia Pet.Co.	Drought #8-1	J. L. Saenz #156	June 20	3017	oil	2064-67	54 BOPD & 80%SW pump	Yegua	U. Eocene
D. C. R. C. 79	Magnolia Pet. Co.	Duval County Ranch 79 #1	C.C.S.D. & R.G.N.G.79	Aug. 18	2539	oil	1478-81	68.84 BOPD pump	Whitsett (Cole)	U. Eocene
El Mosquitte	CAM Corporation	G. N. Olson #1	El.Mosquitte Gr.	May 25	3086	gas	3004-13	3,300 MCFG open flow	Hockley	U. Eocene
Fitzsimmons,North	The Texas Co.	A. C. Garcia #1	H. & G.N.R.R. #429	Aug. 12	5041	oil	4497-4506	89.7 BOPD 44.4 gr.,1/8"Ch.	Pettus	U. Eocene
Government Wells Wilcox	Ralph Fair & Jack Woodward	H. Wendt #1	J. Poitevent #43	Feb. 26	7800'	Gas-dist	7492-7540	16,200 MCFG open flow	Wilcox	L.Eocene
Hagist Ranch	Atlantic Ref. Co.	Hagist Ranch,Inc. #1	B. S. & F. #267	Oct. 5	10,081	Gas-dist.	7044-7208	2,550 MCFG,1/4" Ch.	Wilcox	L. Eocene
Longhorn,South	Hiawatha Oil & Gas Company	Leroy Denman #1	Santos Garcia Gr.	Jan. 8	5757	Gas-dist.	4844-4852	10,000 MCFG open flow	Pettus	U. Eocene
Lovia	R. F. Schoolfield & H. J. Gravis	J. F. Welder Hrs. #1	No. 213	April 24	2684	oil	2662-64	44 BOPD pump	Hockley	U. Eocene

TABLE 1 (Cont'd)
SOUTH TEXAS FIELDS DISCOVERED IN 1948

County & Field	Discovery Well Operator	Discovery Well Fee	Survey	Completion Date 1948	Total Depth Feet	Type Well	Producing Depth Feet	Initial Production Test	Formation	Trend
Duval (Cont'd)										
Lundell, South	Magnolia Pet. Co.	J. C. Wilson # 21	P. E. White # 136	June 10	2807	gas	1460-65	28,000 MCFG open flow	Whitsett (Cole)	U. Eocene
Pantex	Pantex Corp.	Dinecio Perez #1	A.&M.O.R.R. # 141	May 2	3207	oil	2593-2604	72.6 BOPD pump	Hockley	U. Eocene
Poquita Creek	Holly Dev.Co. & Barbara Oil Co.	Driscoll Est. #2	Santa Rosalia Gr.	Aug. 1	2537	oil	2512-37	73.6 BOPD pump	Hockley	U. Eocene
Vaello	Hiawatha Oil & Gas Company	Frank Vaello Jr. #2	San Andress Gr.	Oct. 4	5691	oil	4860-65	86.1 BOPD 43.9 gr., 5/32"Ch.	Pettus	U. Eocene
Edwards										
Holland	V. J. Meyer	Billy Holland #1	H. E. & W.T. #23	Oct. 15	1166	oil	476-541	5 BOPD, 18 gr., pump	Glen Rose	Cretaceous
Frio										
Charlotte, West	Lewis Oil Company	Oppenheimer & Lang # B-1	J. A. Pranglin # 10	Nov. 6	5588	oil	5567½-88	9.67 BOPD 40.1 gr., 3/16"Ch.	Navarro	Cretaceous
Doering Ranch	Humble Oil & Ref. Co.	Frank Doering #1	Oscar Crawford # 10	Dec. 24	6645	oil	5399-5776	72.9 BOPD 26gr., pump	Edwards	Cretaceous
Goliad										
Boyce, West	Hassie Hunt, Tr.	Ollie Webb #1	M. de Jesus Y' Barbo	Dec. 30	7898	oil	4208-14	113.2 BOPD 47.3 gr., 1/8"Ch.	Pettus	U. Eocene
Charco	W. C. McBride, Inc. et al	W. A. Stockton #1-B	Victor Blanco Gr.	Jan. 1.	8511	oil	4590-95	74 BOPD 48.6 gr., 5/16"Ch.	Yegua	U. Eocene
Gottschalt	W.L.Goldston, et al	A. F. Gottschalt #1	Alfred Berry A-59	May 13	8100	gas-dist.	7606-12	8,000 MCFG open flow	Wilcox	L. Eocene
						oil	7676-82	138.2 BOPD 34.7 gr., 1/8"	Wilcox	L. Eocene
Marshall	Sunray Oil Corp.	Fannie O.Marshall #1	Wm. Millican A-201	Apr. 4	9240	gas-dist.	8730.45	49 MCFG 3/8"ch+518 bbls 57 gr. dist.	Wilcox	L. Eocene
Melrose	Atlantic Ref.Co.	G.M. & A. Bluntzer #B-1	J.Cunningham A-64	Sept. 5	9016	gas-dist.	7845-60	1,140 MCFG + 19 BOPD 59.1 gr., 1/4" ch.	Wilcox	L. Eocene
Riverdale	Amarada Pet. Corp.	R. F. Irby #1	M. J. YbarbeGr.	Nov. 19	9758	gas-dist.	9242-58	2,333 MCFG + 61 BOPD 49.2 gr., 5/32" Ch.	Wilcox	L. Eocene
Weesatche, West	H. R. Smith & W.C. McBride, Inc.	Annie Weiss #1	R. E. Handy A-158	Nov. 24	8295	gas-dist.	7843-58	12,800 MCFG open flow	Wilcox	L. Eocene
Guadalupe										
Seguin	Butler Oil Co.	Emil Borchers #1	A. M. Esnavriger	Aug. 27	1192	oil	955-1047	21.2 BOPD 12 gr., 2" open	Buda Lime	Cretaceous
Hidalgo										
Arrowhead	Sun Oil Company	Bentson Bros.#1	El Benadito Gr.	July 4	9120	oil	5967-69	44.2 BOPD 47gr.11/64" Ch.	Frio	L. Oligocene
Jackson										
Sandy Creek	Rock Hill Oil Co.	J. M. Halamicek #1	S. Rogers A-65	Jan. 22	5610	oil	4560-64	108.1 BOPD 25 gr., 1/8"Ch.	Frio	L. Oligocene
Jim Hogg										
San Pablo	Baldridge & King et al	Mrs. S. K. East #3	H & G N # 36	Feb. 27	3890	oil	3875-85	95 BOPD 39 gr., 5/32" Ch.	Pettus	U. Eocene
Jim Wells										
Bandera, North	La Gloria Corp.	Adolph Moos #1	Vincent Ynojosa Gr.	Jan 10	6520	oil	6234-46	2 BOPD jetting	Cook Mountain	U. Eocene
Palito Blanco	The Texas Company	Zella C. Foster #1	Swanson Yarbrow	Oct. 10	7800	gas-dist.	4460-70	11,800 MCFG open flow	Frio	L. Oligocene
Kenedy										
Rita	Humble Oil & Ref. Co.	S. K. East #1	Los Finados	Dec. 30	11,282	oil	7076-78	270 BOPD 3/16" Ch.	Frio	L. Oligocene
Sarita	Humble Oil & Ref. Co.	John G. Kenedy Jr. #B-3	El Paistle Grant	May 22	10,342	gas	5894-5909	13,600 MCFG open flow	Frio	L. Oligocene
Kleberg										
Borregas, West	Humble Oil & Ref. Co.	King Ranch # M.C.-1	Santa Gertrudis	May 24	7047	oil	5960-64	11.4 BOPD 40.2 gr.+ 40% S.W. 3/32" Choke	Frio	L. Oligocene
Lavaca										
Morales, West	Union Producing Co.	Wm. Borchers #1-A	Wm. Hosford A-332	May 1	11,207	gas	2030-40	5,000 MCFG open flow	Catahoula	U. Oligocene
(Unnamed)	Grubb & Hawkins	S. A. Clark #1	J. H. Clayton	Dec. 10	5833	gas	4969-5933?	1,246 MCFG 1/4" choke	Yegua	U. Eocene
Lee										
Tanglewood	Humble Oil & Ref. Co.	Geo. D. Vick #6	Bethel Smith	April 4	6345	oil	6332-41	10 BOPD 31.1 gr. + 50% sulphur water, pump	Edwards	Cretaceous
Live Oak										
Clayton	Western Natural Gas	L. F. Clayton #1	D. R. Fant, Jr. #248	Sept. 1	7150	gas-dist.	6985-95	100,000 MCFG open flow	Wilcox	L. Eocene
Tom Lynne	Atlantic Ref. Co.	Tom Lynne #1	Jacob Cook A-142	Sept. 25	10,000	gas-dist.	9230-60	5,200 MCFG 1/4" Choke	Wilcox	L. Eocene

TABLE 1 (Cont'd)
SOUTH TEXAS FIELDS DISCOVERED IN 1948

County & Field	Discovery Well Operator	Discovery Well Fee	Survey	Completion Date 1948	Total Depth Feet	Type Well	Producing Depth Feet	Initial Production Test	Formation	Trend
Live Oak (Con'td)										
Maxine	Magnolia Pet. Co.	Maxine Means #1	A.C.H. & B. #157	Nov. 20	9002	gas-dist.	8820-25	5,000 MCFG open flow	Wilcox	L. Eocene
McMullen										
San Miguel	Atlantic Ref. Co. & Newman Bros.	Louis M.Gubbels #1	G. H. Smith #26	Nov. 4	6425	oil	6421-25	84.2 BOPD 36.4 gr.,5/32"Ch.	Wilcox	L. Eocene
Milam										
Gause	Standard Oil Co. of Texas	Lucinda Green #1	W. D. Thompson	Aug. 20	5747	oil	5697-5704	30.4 BOPD 30 gr. + 57% Water- Pump	Edwards	Cretaceous
Nueces										
Bailey	Tom Graham, etal	L. Bailey #1	Agua Dulce Farm Lots	Feb. 23	6220	gas-dist.	6148-58	14,500 MCFG open flow	Frio	L. Oligocene
Corpus Christi Bay	The Texas Company	St.of Texas Tr#9-#1	State Tract #9	May 10	11,563	gas-dist.	10,675-88	11,500 MCFG open flow	Frio	L. Oligocene
Corpus, West	Tidewater Assoc.Oil Co.	Guaranty Title & Tr. #1	Enrique Villareal	Jan. 16	11,490	oil	11,115-170	198.2 BOPD 46.2 gr., 5/32"	Frio-Vicksburg	L. Oligocene
Richard King,South	Skelly Oil Company	Richard King #1	Richard King Farm Lots	July 10	6213	gas-dist.	5432-50	8,500 MCFG open flow	Frio-Vicksburg	L. Oligocene
Refugio										
Blanco Creek	Southern Minerals Corp.	W. S. Perryman #1	J. de la Garza Trudo	Oct. 1	7175	gas-dist.	6630-35	27,000 MCFG open flow	Vicksburg	L. Oligocene
						gas-dist.	7114-17	9,250 MCFG open flow	Vicksburg	L. Oligocene
San Patricio										
Blaschke	J.W. Mayo,et al	Blaschke & Mayo #1	Coleman Fulton Pasture Lands	Oct. 30	7016	oil	5288-90	96.3 BOPD 1/8" Ch.	Frio	L. Oligocene
Crabb	A. O. Morgan	W. S. Crabb #1	Geo. Morris A-19	Mar. 3	7485	oil	5498-5502	41.5 BOPD + 95% wtr 5/32"	Frio	L. Oligocene
Mathis,North	Fred M. Manning	Ross Singleton #1	I & G. N. A-172	Jan. 26	5010	gas-dist.	3490-95	7,000 MCFG open flow	Frio	L. Oligocene
Princess Louise	Southern Minerals Corp.	W. Foster # 1	Geo. Morris A-191	Nov. 4	6958	oil	5383-88	79.8 BOPD 34.5 gr. + 28% water 1/4" Choke	Frio	L. Oligocene
Starr										
Borosa	Sunray Oil Corp.	Davenport-State #1	CCSD & RGNG	Oct. 3	6003	oil	4292-4303	114 BOPD 47.6 gr.,5/32"Ch.	Frio	L. Oligocene
Coastal	Coastal Ref. Inc. & W. D. Kennard	Luis Pena #8-1	Porcion 38	Mar. 26	5850	oil	5760-75	38.5 BOPD 42.5 gr., 7/64" Choke	Frio-Vicksburg	L. Oligocene
El Panal	Sunray Oil Corp.	T.B.Slick Est. #1	El Panal Gr.	July 20	6005	gas-dist.	4671-79	2,200 MCFG open flow	Frio	L. Oligocene
La Copita	Rowan & Hope	Bentson Brothers #1	CCSD & RGNG #59	Oct. 13	7003	gas-dist.	5330-35	33,000 MCFG open flow	Frio	L. Oligocene
						oil	6954-56	149 BOPD 40.8 gr.,1/8"Ch.	Vicksburg	L. Oligocene
Semmes	Coastal Ref. Inc.& W. K. Kennard	D. R. Semmes #1	Porcion 88	Oct. 26	3033	oil	2466½-67	13.6 BOPD 3/32" Ch.	Frio	L. Oligocene
Sun, West	Humble Oil & Ref. Co.	E. Block Heirs #3	Los Retaches Gr.	April 10	9206	oil	8833-48 8870-80	41.4 BOPD 52.5 gr.,3/16" Ch.	Cook Mountain	U. Eocene
Victoria										
Fleming	Jergins Oil Company	J. H. Fleming #1	F.G. Hidalgo Gr.	Sept. 9	5036	gas-dist.	3264-65½	423 MCFG 1/8" Ch.	Frio	L. Oligocene
Inez, South	Cities Service Oil Co.	Mrs. S. H. Baker #1	Valentia Garcia Gr.	April 1	6816	gas-dist	6240-49	7,400 MCFG open flow	Vicksburg	L. Oligocene
Marcado Creek,No.	Taylor Refining Co.	Meta Hanselmann #1	Chas. Grenor A-173	June 25	4743	gas-dist.	4678-84	50,000 MCFG open flow	Frio	L. Oligocene
(Unnamed)	Dancinger Oil & Ref.Co.	J. W. Bass #1	F.C. Hidalgo Gr.	July 10	5186	gas-dist.	4618-20	33,900 MCFG open flow	Frio	L. Oligocene
(Unnamed)	Fidelity Oil & Roy. Co.	W. H. Reeves #1	J. M. Cobarrubias	Nov. 10	5627	gas-dist.	4010-20	64,000 MCFG open flow	Frio	L. Oligocene
(Unnamed)	Woodley Pet. Company	G. A. Musselman #1	W. W. Nichols	Nov. 20	5502	gas-dist.	2266-76	3,150 MCFG open flow	Catahoula	U. Oligocene
Webb										
Quien Sabe	O. W. Killam, et al	Mars McLean #1	Albercas Grant	Feb. 1	2658	gas-dist.	2314-16	36,000 MCFG open flow	Hockley	U. Eocene
Wilson										
Floresville,East	Sunray Oil Corp.	B. B. Hardy #1	Joseph Reynolds A-267	Sept. 16	2749	oil	2728½-49	72 BOPD 21.8 gr.,pump	Midway	L. Eocene
Reklaw	W. C. McBride,Inc.	C. E. Hart #1	Simon & Juan Arocha Grant	Jan. 27	592	oil	586-88	19.1 BOPD 16.8 gr. + 85.5% water, pump	Reklaw	L. Eocene

total production of the United States and Texas over the 10-year period 1939–1948. The 169,739,954 barrels of oil produced from the 512 fields in the district exceeded the 1947 production by 15,560,228 barrels. A net increase of 963 producing oil wells was noted during the year. In all, 16,738 wells, 7,333 flowing and 9,405 artificial lift wells, were recorded on the proration schedule of the Railroad Commission of Texas, Oil and Gas Division, for the month of December, 1948.

The liquids processed from casinghead gas and free gas added another 12,296,755 barrels of products produced from the fields of the district. The ability of the South Texas operators to gather and market casinghead gas from oil wells at a fair value has resulted in 5 938 of the wells being serviced. At the end of 1947 only 15 per cent of the oil wells were connected with casinghead-gas processing systems. The close of 1948 showed 36 per cent of the oil wells in the district were connected with gathering systems. The percentage of casinghead gas gathered and marketed is expected to increase as additional gas transmission lines are projected into the area. At present only 5.6 per cent of the 147.1 billion cubic feet of casinghead gas produced annually is delivered to transmission lines. Thirty-four per cent of the casinghead gas is being returned to the reservoir for pressure maintenance purposes.

The free gas wells produced 585.8 billion cubic feet of gas during 1948 and delivered to transmission lines 26 per cent of this total. Fifty-four per cent of the total free gas produced was returned to the formation either for pressure maintenance or cycling purposes. During December, 1948, there were 1,221 gas wells reporting production to the Railroad Commission.

PRE-CRETACEOUS TREND

No commercial production has as yet been found in reservoirs of pre-Cretaceous age in the South Texas district. Exploration for production in this trend, which has been almost entirely confined to the Edwards Plateau area, has not been intensive, but remains as a major challenge to petroleum geologists and operators alike.

CRETACEOUS TREND

Interest in the Cretaceous trend, as reflected by drilling operations, continued upward during 1948 and resulted in the drilling of 203 wildcat wells, almost twice the number accredited this trend during the previous year. While 10 of these tests were successfully completed as oil wells, none appear at this early stage of development to have uncovered reserves of major importance. The Doering Ranch field, discovered by the Humble Oil and Refining Company and completed in the Edwards limestone during December, is probably the most important discovery in the trend. The Doering Ranch field is located on strike and southwest of the old Pearsall field, in Frio County. Five wells drilled in the Cretaceous trend encountered basement rock.

Eighty per cent of the 319 wells drilled in proved areas were successful, 253

being completed as oil producers and 3 were completed as gas wells. Field development exploration found new productive zones in 3 fields. More than a third of the field development drilling in the Cretaceous trend was located in the Charlotte field of Atascosa County where 113 oil wells and 4 dry holes were drilled during the year. Approximately 18 per cent of the producing oil wells in the South Texas district are located in fields of the Cretaceous trend, and, during 1948, accounted for 5 per cent of the total production.

LOWER EOCENE TREND

The rate of wildcat exploratory development in the lower Eocene trend was almost the same as was experienced during the previous year. The 96 wildcat wells drilled resulted in the discovery of 6 oil and 12 gas productive areas. One of the discoveries, W. A. Goldston *et al.* A. F. Gottschalt 1, was dually completed as an oil and gas producer. A successful completion rate of 20 per cent for wildcat wells drilled in this trend has been maintained for the past 2 years. The Holly field in DeWitt County, discovered by the Holly Development Company, is probably the most important oil discovery in the lower Eocene trend during the year. The Holly field, producing from the Wilcox and completed in January, had 9 producing oil wells which accounted for 8,000 barrels of oil in December. The Government Wells-Wilcox field in Duval County, discovered by Ralph E. Fair and Jack Woodward, Inc., has uncovered another large gas reserve in the Wilcox.

Field development resulted in the drilling 160 tests, 89 per cent successfully completed, 104 as oil producers, and 41 as gas producers. Local development of productive sands in the Reklaw section has been noted in a few downdip parts of the lower Eocene trend. Four gas and 12 new oil reservoirs were found in established fields of this trend. Forty-nine fields having 4 per cent of the oil wells in South Texas accounted for almost 5 per cent of the total oil produced from the area.

UPPER EOCENE TREND

A forty-five per cent increase in the rate of wildcat drilling in the upper Eocene trend was noted over the rate of the previous year. Only 7 per cent of the 245 wildcat tests drilled were completed as productive; of the discoveries 12 were oil wells and 5 gas wells. Oil production was found by additional developments in 3 of the 5 gas discoveries. Ten of the 17 new fields, completed in sands of the Jackson-Yegua-Cook Mountain series, were located in Duval County. The most important of the Duval County discoveries was the South Longhorn field, drilled by the Hiawatha Oil and Gas Company, where 8 additional wells found 3 new oil and one new gas reservoir. Another important discovery for the trend was the San Pablo field of Jim Hogg County drilled by Baldridge and King. By the end of the year 29 oil wells were producing from the Pettus sand and the December oil production amounted to 44,258 barrels. The Quien Sabe field in Webb County, discovered by O. W. Killam, should also be acknowledged as a field of importance for this trend. By the end of the year 22 wells had been completed in the Hockley

section of the Jackson and during December these wells produced 37,425 barrels of oil.

During 1948 there were 593 tests drilled in fields of the upper Eocene trend; 71 per cent were completed as productive, 389 as oil wells and 38 as gas wells. Field development resulted in the addition of 12 oil and 4 gas reservoirs. Twenty-nine per cent of the producing oil wells in South Texas are in fields of this trend which accounts for 13 per cent of the total production of the district.

LOWER OLIGOCENE TREND

A total of 1,247 wells were drilled in the lower Oligocene trend during 1948. Field development wells accounted for 977 tests; 80 per cent of the total were successfully completed, 745 as oil wells and 119 as gas wells. Eighty-six of the producers were dually completed. Sixty-seven new oil reservoirs and 41 new gas reservoirs were found by tests drilled in proved areas.

Wildcat exploration in the Frio-Vicksburg sand trend was 100 per cent above the rate of the previous year. Twelve per cent of the 267 wildcat tests drilled were completed as productive as 16 oil reservoirs and 16 gas reservoirs were found in 30 separate areas. Two of the discovery wells were dually completed. Probably the most important of the 1948 lower Oligocene discoveries were the East Long Mott field of Calhoun County, the Rita and Sarita fields in Kenedy County, and the El Panal field in Starr County. The Sarita field in Kenedy County, discovered by the Humble Oil and Refining Company, was initially completed as a gas well but was recompleted in a shallower reservoir as an oil producer later in the year.

While the 7,562 oil wells producing from Frio-Vicksburg reservoirs are only 46 per cent of the total oil wells in South Texas they produce 74 per cent of total oil.

UPPER OLIGOCENE-LOWER MIOCENE TREND

Few wildcat wells are drilled for the primary purpose of producing oil from beds of the upper Oligicene or lower Miocene age. Most of the discoveries in this trend were Frio-Vicksburg tests that were plugged back to produce in the shallow reservoirs of the upper Oligocene and lower Miocene. As a result the percentage of successful tests appear to be exceptionally high in this trend. Seventeen wildcat tests were drilled in this trend and resulted in the discovery of an oil field and three gas fields; a successful completion rate of 24 per cent. None of these reservoirs appears at this stage of development to be a major reserve. The 292 wells producing from reservoirs of upper Oligocene-lower Miocene age account for 2 per cent of the total South Texas production.

BULLETIN OF THE AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS
VOL. 33, NO. 6 (JUNE, 1949), PP. 956-965, 1 FIG., 3 TABLES

DEVELOPMENTS IN EAST TEXAS IN 1948[1]

G. C. CLARK[2]
Tyler, Texas

ABSTRACT

During 1948, 873 wells were drilled in the East Texas district; of this number 147 were wildcats and field-extension wells. Twenty-one new-field and new-pool discoveries were drilled; 12 of the 21 were considered new-field wildcats; 3 were deeper-pool discoveries, 6 were shallower-pool discoveries; and the remainder of the 147 were dry holes. These developments include new production from formations as follows: sub-Clarksville 3, Woodbine 4, Goodland 1, Paluxy 2, Rodessa 5, Pettit 4, and Travis Peak 2. None appears to be a major discovery, with the exception of Mitchell Creek, Paluxy discovery by the Shell Oil Company on an extension of the Talco fault system. New producing zones were discovered in the Coke, Yantis, Blackfoot, Quitman, Tri-Cities, and Jefferson fields.

Accumulated production for the district has reached a total of 3,470,346,500 barrels. Of this total, 2,588,533,142 barrels have been produced from the East Texas field. This year's production from the entire district was slightly lower than the previous year, being 174,580,000 barrels as compared with 174,846,263 for 1947.

Approximately 448,100 acres were leased during the year at an average price of $9.38 per acre.

Geophysical exploration work weeks increased 9 per cent over 1947 for a total of 877 work weeks. This increased activity has been distributed throughout the counties in the central and southern part of the district.

INTRODUCTION

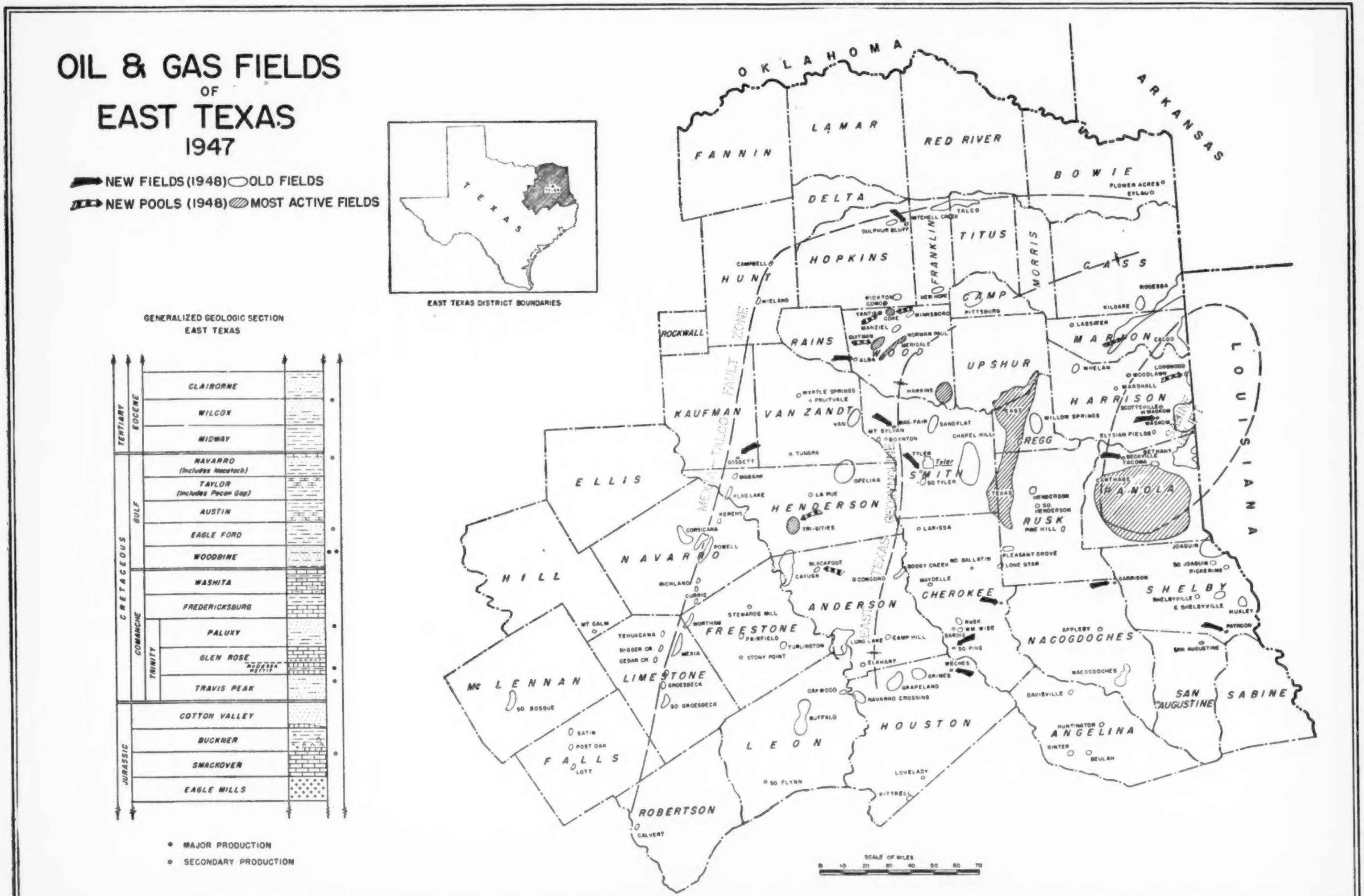
The East Texas district (Fig. 1) includes 42 counties in the northeastern corner of the state. The geological provinces represented in these 42 counties include the Mexia-Talco fault zone, the East Texas embayment, and the Sabine uplift. Drilling and exploration activities during the past year were evenly divided throughout the district, the successful drilling ventures being situated chiefly within the embayment area. The prime objectives within this area have been the sub-Clarksville, Woodbine, Rodessa, and Pettit. These formations have been encountered between depths of 5,000 and 10,000 feet. The major trend of development has been for the shallower zones as reflected by 3 discoveries from the sub-Clarksville, 4 from the Woodbine. High drilling costs probably account for so few tests being drilled below 10,000 feet.

WILDCAT DRILLING

Drilling operations in the district increased 32.8 per cent over 1947. A total of 873 wells were drilled, of which 147 were wildcats and field extension wells. A total of 21 new discoveries were made for a percentage of 14.28 or an increase of 7.8 over the previous year. Of these 21 discoveries 12 were new-field wildcats, 6 were shallower-pool discoveries and 3 were deeper-pool discoveries. Of the 21 new discoveries 16 were oil wells and 5 were gas-distillate wells. Tabular comparison of this development is presented in Table I.

[1] Manuscript received, March 19, 1949.

[2] Stanolind Oil and Gas Company. The writer expresses appreciation to W. E. Long and Ed L. Knaack for assistance in the preparation of this report.



OIL & GAS FIELDS
OF
EAST TEXAS
1947
NEW FIELDS (1948)
OLD FIELDS
NEW POOLS (1948)
MOST ACTIVE FIELDS
TEXAS
EAST TEXAS DISTRICT BOUNDARIES
GENERALIZED GEOLOGIC SECTION
EAST TEXAS
TERTIARY
EOCENE
CLAIBORNE
WILCOX
MIDWAY
CRETACEOUS
GULF
NAVARRO (Includes Nacatoch)
TAYLOR (Includes Pecan Gap)
AUSTIN
EAGLE FORD
WOODBINE
COMANCHE
WASHITA
FREDERICKSBURG
TRINITY
PALUXY
GLEN ROSE
TRAVIS PEAK
JURASSIC
COTTON VALLEY
BUCKNER
SMACKOVER
EAGLE MILLS
MAJOR PRODUCTION
SECONDARY PRODUCTION
OKLAHOMA
ARKANSAS
LOUISIANA
FANNIN
LAMAR
RED RIVER
BOWIE
DELTA
HOPKINS
FRANKLIN
TITUS
MORRIS
CASS
HUNT
CAMP
ROCKWALL
RAINS
WOOD
UPSHUR
MARION
HARRISON
KAUFMAN
VAN ZANDT
GREGG
SMITH
ELLIS
HENDERSON
RUSK
PANOLA
NAVARRO
HILL
ANDERSON
CHEROKEE
SHELBY
FREESTONE
NACOGDOCHES
McLENNAN
LIMESTONE
SAN AUGUSTINE
SABINE
HOUSTON
ANGELINA
FALLS
LEON
ROBERTSON
MEXIA-TALCO FAULT ZONE
SABINE UPLIFT
EAST TEXAS
SCALE OF MILES
0 10 20 30 40 50 60 70

FIG. 1

NEW FIELDS

Of the 21 new discoveries in 1948, none is of major geological significance inasmuch as they are either producing from known Cretaceous producing zones or the extent of the field has been partly defined by dry holes.

Cherokee County (*field not named*).—Caraway's Bolls No. 1, 9 miles east of Rusk, in the east-central part of the county, encountered the top of the Woodbine producing zone at 4,372 feet, and drilled the total depth of 4,400 feet. The well was completed on November 2, 1948. Its initial potential was 33 million cubic feet of gas per day with a rock pressure of 1,590 pounds.

TABLE I
FIELD WELLS
COMPLETED WELLS

	1946	*1947*	*1948*
Field wells			
Oil wells	389	392	569
Gas wells	143	91	88
Dry holes	61	74	69
Total	593	557	726
Wildcat wells			
Oil wells	8	5	16
Gas wells	4	3	5
Dry holes	81	93	126
Total	93	101	147
Total completions	686	658	873

This discovery was based on both surface and subsurface information, the discovery well being the fourth well drilled in the area by the operator. Since its completion one additional producer and one dry hole have been drilled, with the dry holes distributed in three directions surrounding the two producers. A large reservoir is not anticipated.

Cherokee County (*Southern Pine field*).—Geier-Jackson's Southern Pine Lumber Company No. 1 is 10 miles southwest of Alto, near the common corner of Anderson, Houston, and Cherokee counties. This test was completed on September 14, 1948, with a flowing potential of 219 barrels of oil and 73 barrels of salt water on $\frac{3}{4}$-inch choke with tubing pressure 125 pounds and casing pressure 490 pounds. The test encountered Woodbine sand at 5,250 feet and was drilled to the total depth of 5,450 feet.

The location of this test was made on a farm-out from the Continental Oil Company which had purchased the block 5 years previously on seismic information. The Continental drilled one dry Woodbine test in 1944, 1,500 feet east of the discovery. Since completion of the discovery, Geier-Jackson Inc. has

drilled 2 dry offsets, one northwest and one southwest, thus limiting the size of the pool in three directions.

Harrison County (*West Waskom field*).—Johnston's Hood No. 1, 5 miles west of the Waskom field, was temporarily abandoned, October 8, 1947, and on July 1, 1948, this test was reworked and completed for an initial potential of 1,270,000 cubic feet of gas per day from the Pettit limestone encountered at 6,163 feet; total depth was 6,445 feet.

The completion of this gas well indicates a new field, inasmuch as this gas is coming from a structural position considerably lower than water has been encountered on the flank of the Waskom field. Although this is a small producer, it is evidence of productive stratigraphic traps along the flanks of the Sabine uplift, and opens a large area for exploration.

Hopkins County (*Mitchell Creek field*).—The Shell Oil Company's Hedrick No. 1, $5\frac{1}{2}$ miles southeast of Sulphur Bluff, was completed, December 5, 1948; initial potential, 207 barrels of 19.5° gravity crude pumped from Paluxy sand encountered at 4,480 feet; total depth, 4,600 feet. Since completion of the discovery well the same operator had completed 3 additional oil wells by the end of the year.

The location for the discovery well was made following a detailed seismic survey made for the Shell Petroleum Company by the Southern Geophysical Company. The trap is formed by a down-at-the-north fault which appears to be a part of the Talco fault system. It is anticipated that this field will be of sufficient size to stimulate additional drilling along the fault system.

Houston County (*Weches field*).—Adams' Holcomb No. 1, 2 miles southwest of Weches, was completed on September 12, 1948, for an initial potential of 111 barrels of oil and 55 barrels of salt water, pumped in 24 hours. The well is producing through perforations opposite the Woodbine sand at 5,742–5,746 feet.

The location for this test was made on subsurface information. The oil is being trucked to the Pan American pipe line. As no other development has taken place in this area, an estimate of the size of the field is impractical at this time.

Kaufman County (*Gossett field*).—Humphries' Tuggle No. 1, 2 miles north of Gossett in southern Kaufman County, was completed, July 20, 1948, for an initial potential of 68 barrels of oil per day from the Bacon limestone encountered at 6,106 feet; total depth, 7,000 feet.

This test was located by the use of both surface and subsurface information and is situated on a down-at-the-west fault along the Mexia fault system. Although several dry holes are situated close to the discovery well, none of these has drilled to sufficient depth to test the producing zone. It is therefore impracticable to estimate the size of the accumulation.

Nacogdoches County (*Garrison field*).—The Arkansas Fuel Oil Company's Adams No. 1, one mile east of Garrison in the northeast corner of the county, was completed, November 3, 1948, from perforations at 7,109–7,119 feet, opposite the Pettit limestone, for a potential of 1,310,000 cubic feet of gas per day, with

rock pressure 3,199 pounds. The total depth of this test is 7,865 feet, in Travis Peak sandstone.

This location was made after extensive seismic work had been done by the operator in the area. At the end of the year the test was shut-in awaiting pipe-line connections.

Panola County (*Beckville field*).—Hollingsworth's Crain No. 1, 5 miles northeast of Beckville in northwestern Panola County, was completed, May 25, 1948, through lower Pettit perforations at 6,538–6,560 feet, for an initial potential of 36 million cubic feet of gas per day, with 32 barrels of 63° gravity distillate per million, and rock pressure of 2,701 pounds.

At the end of the year the Railroad Commission had refused a new field allowable until further exploration could prove that it is on a separate structure from the Carthage field. The well is producing from a lower position structurally than any other well on the west side of the field, and at present appears to have opened a new field. The location was made on subsurface information, with the operator anticipating either a stratigraphic trap or a separate closure on the flank of the Sabine uplift.

Shelby County (*Patroon field*).—The Humble Oil and Refining Company's Pickering Lumber Company No. 1-C, 2 miles east of Patroon in southeastern Shelby County, was completed, July 8, 1948, through perforations opposite Pettit limestone at 5,164–5,212 feet, and flowed 109 barrels of 31° gravity oil in 24 hours, with tubing pressure of 935 pounds and casing pressure of 1,160 pounds, and gas-oil-ratio of 11,050 to 1.

This test was located in an area of scattered subsurface control in which the operator had done extensive seismic work. A second test was drilled approximately one mile west of the discovery well by the same operator and was abandoned at 5,492 feet after failing to encounter favorable showings in the Pettit limestone. Although the field is limited in one direction, it opens a very large area worthy of further exploration in the south part of the East Texas district.

Smith County (*field not named*).—The Magnolia Petroleum Company's Fair No. 1, 2 miles north of Mt. Sylvan in northwestern Smith County, was completed, April 10, 1948, from perforations opposite the Rodessa limestone at 9,512–9,572 feet, for a flowing potential of 96 barrels of oil per day plus 7 barrels of salt water and ½ million cubic feet of gas, tubing pressure 394 pounds, casing pressure 663 pounds, gravity 59.3°, and gas-oil-ratio 21,804 to 1. Although the production was small from this relatively deep test, it appeared sufficient to justify a second well in the area which at the end of the year was drilling at 6,640 feet.

The discovery location was made as a result of early seismic work. Additional detail seismic work was done prior to the staking of the Pierce No. 1, 2 miles south of the discovery well.

Smith County (*Tyler pool*).—The Delta Drilling Company's Rice No. 1, 3½ miles southwest of Tyler, Smith County, was completed, October 6, 1948, for an initial potential of 86 barrels of 26° gravity oil per day, pumping from perforations opposite the Paluxy sand at 7,572–7,608 feet.

This test was located near the south extremity of the Paluxy sand development, and it is anticipated that if a sizable reservoir is found at this particular location, others may be found on favorable structure this far south. The location was made as a result of subsurface and seismic information.

Wood County (*Alba field*).—Bridewell-Jackson's McKenzie No. 1, one mile northeast of the town of Alba, was completed, May 15, 1948, for an initial potential of 50 barrels of 15° gravity oil per day, pumping from sub-Clarksville sand at 4,025–4,123 feet.

The Alba structure has long been recognized as a deep-seated salt dome, and the structural relief had previously been delineated by seven dry holes. The location was made as a result of subsurface information and showings of oil logged by the previous tests. At the end of the year nine wells had been completed from the sub-Clarksville sand. This discovery stimulated considerable shallow exploration on known deeper producing structures in northern Wood County.

SHALLOWER PRODUCING ZONES IN OLD FIELDS

Anderson County (*Blackfoot field*).—The Texas Company's Broadway No. 1, was completed as a shallower producer from the Rodessa, encountered at 8,972 feet, total depth 9,907 feet. The daily initial production was 40 barrels of oil. Since the discovery seven pool wells had been completed from this new zone during the year. This shallower discovery was an east offset to the "field discovery" which produced from the Pettit. The Broadway No. 1 was the second well to be drilled in the field and was completed from Rodessa limestone after failing to encounter Pettit porosity.

Henderson County (*Tri-Cities field*).—Hinton's Gladney No. 1-C discovered oil in the Bacon limestone topped at 7,720 feet, and was completed for 237 barrels of oil per day, total depth 9,099 feet. Only this one well has been completed as an oil producer from this zone. At the end of the year the east offset was shut down at the total depth 8,465 feet.

Wood County (*Yantis field*).—The Humble Oil and Refining Company's Rhodes No. 1 discovered a shallower Eagle Ford sand and was completed, February 19, 1948, after plugging back to 4,260 feet from the total depth of 8,250 feet. The test flowed 63 barrels of 20° gravity oil per day through 2-inch choke, with tubing pressure 20 pounds, casing pressure of 80 pounds, and gas-oil-ratio 60 to 1. The test was later recompleted on February 27, 1948, through perforations at 4,216–4,227 feet and pumped 277 barrels of oil per day. At the end of the year 20 wells in the Yantis pool had been completed from this sand.

Wood County (*Coke field*).—Hawkins' Clark No. 1-A shallower zone discovery was completed in the sub-Clarksville sand at 4,056–4,113 feet and pumped 128 barrels of 15° gravity oil per day, total depth 4,138 feet. At the end of the year there were 23 sub-Clarksville wells producing in the Coke field.

Wood County (*Quitman field*).—Lacy's Cox No. 2-A shallower zone discovery was completed from the Woodbine formation topped at 4,344 feet for an initial potential pumping 266 barrels of 15° gravity oil per day, total depth 4,359 feet.

This additional pay for the Quitman field has not stimulated added development, and at the end of the year there was one well producing from this zone.

Harrison County (*Longwood field*).—Wilson's Hearne No. 1-B, 3 miles east of Leigh, was completed as a shallower discovery in the Goodland limestone section encountered at 2,340 feet, with a potential of 30 barrels of oil per day. This well was commenced as a Pettit test and was plugged back from the total depth of 5,590 feet after failing to encounter favorable showings of gas or oil in either the Rodessa or Pettit zones.

Structurally, the shallower producing zone is situated on the Sabine uplift 7 miles north of Waskom, and in the same structural position with the field as mapped on the Woodbine. At the end of the year there was one well completed from the Goodland limestone.

DEEPER PRODUCING ZONES IN OLD FIELDS

Anderson County (*Blackfoot field*).—The Texas Company's Hanks No. 1 opened a deeper producing zone for the Blackfoot field by completing from the Travis Peak sandstone encountered at 9,960 feet, and pumped 62 barrels of 44° gravity oil per day with gas-oil-ratio of 592 to 1. Although a small producer, this well has proved Travis Peak production for the Blackfoot trend and opens a comparatively large area as possibly productive from this deeper zone. At the end of the year the Hanks No. 1 was the only well in the Blackfoot field producing from the Travis Peak zone.

Marion County (*Jefferson field*).—Pewitt's Ralph No. 1-B was a deeper discovery in the Jefferson-Rodessa field. This test was completed for an initial potential of 10 million cubic feet of gas per day from Travis Peak sand encountered at 7,984 feet. In addition to the producing zone encountered at this depth, several showings of oil and gas were logged in cuttings in the lower Travis Peak and Cotton Valley sandstones. The well was plugged back after reaching the total depth of 9,636 feet. Subsequent drilling in this area has failed to encounter this producing zone, which fact is suggestive of lenticular producing sands within the Travis Peak formation.

FIELD DEVELOPMENTS

Field completions in the East Texas district total 726 as compared with 557 for 1947. This shows a 30 per cent increase. The large increases in the number of completions are distributed through the East Texas, Merigale-Paul, Coke, Carthage, Quitman, and Tri-Cities fields. There has been a 100 per cent decrease in the drilling at Hawkins, while the East Texas field has shown an increase of 100 per cent. Table II shows the number of 1948 completions within the nine most active fields as well as the total number of wells drilled.

FIELD PRODUCTION

Accumulated production for the district has reached the total of 3,470,346,500 barrels. Of this total 2,588,533,142 barrels have been produced from the East

Texas field. This year's production from the entire district was slightly lower than the previous year, being 174,580,000 barrels as compared with 174,846,263 for 1947.

EXPLORATORY TESTS

The most important test so far as deep development is concerned is the Humble's McWatters No. 1, southern Freestone County. Although not completed at the end of the year, this well had reached the total depth of 16,374 feet, and was to be plugged back for completion in either the Pettit or Travis Peak zone, after failing to reach the Smackover at total depth. The most significant information gained from this test was the extreme thick limestone section in the lower Cotton Valley. This test is 15 miles east of the nearest Smackover control in the Mexia pool. The control, as gained from the Humble test, shows at least 8,000 feet of dip on Lower Jurassic beds into the East Texas basin within 15 miles and approximately 2,000 feet of thickening of the Cotton Valley zone within this same distance. If this rate of dip and thickening continues eastward to the center of the basin, it is anticipated that the Smackover will not be reached above 20,000 feet.

TABLE II
NINE MOST ACTIVE FIELDS 1948

Field	*Producers*	*Dry*	*Total Wells Jan. 1, 1949*
Carthage	49	3	336
Coke	30	0	61
Como	19	3	20
East Texas	307	7	26,457
Hawkins	10	4	656
Merigale-Paul	48	4	137
Quitman	23	4	125
Tri-Cities	24	4	43
Yantis	20	4	21

Numerous other tests were drilled within the district, but few contributed anything new to the regional geology. Most of them either failed to be on local structural anomalies or failed to encounter porosity in the anticipated pay zones.

GEOPHYSICAL EXPLORATION AND LEASING ACTIVITY

Geophysical exploration work weeks increased 9 per cent in the district during the year 1948. A total of 877 crew weeks represents the amount of work done; this includes seismic, gravity, and core work. The majority of the work weeks are represented by a total of 588 seismic crew weeks, the core work represents 83 and the gravity 206 work weeks. This work has been distributed throughout the central or embayment area, with a slight concentration in the south tier of counties where more leases are available.

TABLE III

County	Field	Operator	Farm Well No.	Survey	Location	Class	Producing Formation	Depth to Top of Pay	Total Depth	Daily Initial prod. Barrels	Method of Exploration
Anderson	Blackfoot	Texas Co.	Broadway #1	Jas.Welsh	5 mi NW Mountalba	S.P.	Rodessa	8972'	9907'	40.68 BO	Subsurface
Anderson	Blackfoot	Texas Co.	Hanks #1	W.Albright	4½ mi NW Mountalba	D.P.	Travis Peak	9960'	10,080'	62.62 BO	" "
Cherokee	No Name	Caraway	Bolls #1	J.M.Musquez	9 mi E Rusk	N.F.W.	Woodbine	4372	4400'	33 Mil.CFG	Surface & Subs.
Cherokee	Southern Pine	Geier-Jackson	Southern Pine Lbr.#1	T.N.Jones	10 mi SW Alto	N.F.W.	Woodbine	5313'	5450'	219.43 BO	Seis.
Harrison	Longwood	Wilson	Hearne #1-B	F. C. Baker	3 mi E Leigh	S.P.	Goodland	2340'	5590'	30.36 BO	Subsurface
Harrison	W.Waskom	Johnston	Hood #1	L.Wallace	7 mi NW Elysian Fields	N.F.W.	Pettit	6160'	6447'	1,270 MCFG	" "
Henderson	Tri-Cities	Hinton	Gladney #1-C	C. Riley		S.P.	Bacon	7720'	9099'	237 BO	" "
Henderson	Tri-Cities	Stanolind	Meredith #1	W. Kay		D.P.	Rodessa	7695'	8750'	238 BO	" "
Hopkins	Mitchell Creek	Shell	Hedrick #1	G.B.Halyard	5½ mi SE Sulphur Bluff	N.F.W.	Paluxy	4500'	4800'	118.8 BO	Seis.
Houston	Weches	Adams	Holcomb #1	D. McLen	2 mi SW Weches	N.F.W.	Woodbine	5742'	5865'	111.5 BO	Subsurface
Kaufman	Gossett	Humphries	Tuggle #1	E.Fitzgerald		N.F.W.	Bacon	6106'	7000'	68.6 BO	Surface & Subs.
Marion	Jefferson	Pewitt	Ralph #1-B	W.N.Peacock		D.P.	Travis Peak	7984'	9636'	10 Mil.CFG	Subsurface
Nacogdoches	Garrison	Ark-Fuel	Adams #1	H.Graham	1 mi E Garrison	N.F.W.	Pettit	7109'	7865'	1.3 Mil CFG	Seis.
Panola	Beckville	Hollingsworth	Crain #1	A.B.Sweeten	5 mi NE Beckville	N.F.W.	Pettit	6538'	7012'	36.3 Mil CFG	Subsurface
Shelby	Patroon	Humble	Pickering Lbr.Co.#1-C	Jas. Rowe	2 mi E Patroon	N.F.W.	Pettit	5164'	9300'	109.16 BO	Seis.& Subs.
Smith	No name	Magnolia	Fair #1	W.Schoefield	2 mi N Mt.Sylvan	N.F.W.	Rodessa	9512'	10,493	96.09 BO & 558 MCFG	Seis.& Subs.
Smith	Tyler	Delta	Rice #1	O. Anderson	3½ mi SW Tyler	N.F.W.	Paluxy	7572'	7890'	86.36 BO	Seis.& Subs.
Wood	Alba	Bridewell Jackson	McKenzie #1	J. Sherman	1 mi NE Alba	N.F.W.	Subclarksville	4025'	4123'	128.35 BO	Subsurface
Wood	Yantis	Humble	Roades #1	J. Groce		S.P.	Eagle Ford	4216'	8250'	277.38 BO	Subsurface
Wood	Coke	Hawkins	Clark #1-A	B. Smith		S.P.	Subclarksville	4056'	4138'	128.35 BO	Subsurface
Wood	Quitman	Lacy	Cox #2-A	J. Barfield		S.P.	Woodbine	4355'	4359'	266.64 BO	Subsurface

Approximately 448,100 acres were leased during 1948 at the average price of $9.38 per acre. A review of the non-productive acreage held under lease by the major companies shows a total of 2,768,278 acres at the end of the year. This represents 13 per cent of the entire district, and if concentrated within the central part of the district and added to the productive acreage, it leaves a small percentage of the total area remaining unleased.

1948 TRENDS

Although there was a marked increase in drilling and exploration activity for 1948, the close of the year saw a definite swing toward conservatism, a cut in allowable plus a buyers' strike against high-priced leases, and high drilling costs causes the industry to expect 1949 to be more closely comparable with 1947 than the boom year 1948.

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DEVELOPMENTS IN UPPER GULF COAST OF TEXAS IN 1948[1]

F. E. METTNER[2]
Houston, Texas

ABSTRACT

The Upper Gulf Coast district of Texas is composed of 26 counties in the southeastern part of the state. It is identical with Texas Railroad Commission District 3, omitting Fayette and Lee counties.

There were 1114 wells drilled in the district in 1948, which is a 27 per cent increase over 1947. Of these, 212 were wildcat tests drilled in search of new structures. This represents an increase of 14 per cent over 1947 and resulted in the discovery of 22 new fields as compared with 20 new fields in 1947. These new discoveries consisted of 9 oil fields, 10 gas-condensate fields, and 3 gas fields. All are of minor importance, the Lane City Townsite field, Wharton County, being the most important. First production was discovered in Jasper County, Buna field, and a new Cretaceous producing zone was found in Trinity County, in the northwest Glendale field.

Considerable more reserves were added by development in old fields. Nine hundred two wells were drilled on known structures, which resulted in the discovery of 77 new sands, 31 new reservoirs, and 22 important extensions. This is a considerable increase over 1947. Most of these additions to reserves were the result of the discovery of new fault segments and new sands on old salt domes.

Two wildcat wells were completed as dry holes in the Gulf of Mexico, one of which is believed to have discovered a new salt dome 18 miles southeast of Galveston.

First production was established on an interior salt dome in Madison County.

Forty seismic reflection parties were operating at the end of the year as compared with 35 at the first of the year. The most active counties were Brazoria, Matagorda, and Wharton, with some work being conducted on offshore leases.

Total oil and condensate production in 1948 amounted to 197,055,000 barrels, which is an increase of 6 million barrels over 1947.

The reflection seismograph, in conjunction with subsurface geology, was the most successful exploration method.

INTRODUCTION

The Upper Gulf Coast district of Texas is composed of 26 counties in the southeastern part of the state. It is identical with Texas Railroad Commission District No. 3, omitting Fayette and Lee counties.

The classification used in this paper as it pertains to wildcat wells includes only those tests which were drilled in search of new structures. Only those wells which discovered production on new structures are listed as new field discoveries. Others are included in the list of new reservoirs, new sands, and extensions on known structures.

DEVELOPMENT

There were 1,114 wells drilled in the district during 1948, which is a 27 per cent increase over 1947. Of these, 212 were wildcat tests drilled in search of new structures. This represents an increase of 14 per cent over 1947 and resulted in the discovery of 22 new fields as compared with 20 discoveries in 1947. These new discoveries consisted of 9 oil fields, 10 gas-condensate fields, and 3 gas fields. All are of minor importance.

Considerable more reserves were added by development in old fields. In all,

[1] Manuscript received, March 7, 1949.

[2] The Texas Company. The writer was furnished a list of important exploratory wells by P. F. Sollars of the Committee on Statistics of Exploratory Drilling which was most helpful and greatly appreciated. The assistance of R. B. Coddou and others in preparing the map, typing, proofreading, *et cetera*, is acknowledged and appreciated.

902 wells were drilled on known structures which resulted in the discovery of 77 new sands, 31 new reservoirs, and 22 important extensions. This is a considerable increase over 1947. Most of these additions to reserves were the result of the discovery of new fault segments and new sands on old salt domes.

Total crude oil production in 1948 amounted to 182,363,000 barrels. Condensate production was 14,792,000 barrels, making a total of 197,055,000 barrels for both crude oil and condensate. This is an increase of approximately 6 million barrels over 1947.

NEW FIELDS

Twenty-two new fields were discovered in 1948 as compared with 20 in 1947. The percentage of successful wildcats was 10.4.

All of the new fields are of minor importance. Twelve of these discoveries are producing from the Frio, 6 from the Yegua, 2 from the Wilcox, and 1 each from the Crockett and Cretaceous. There were no new discoveries in the Miocene in 1948.

The Frio accounted for the most discoveries as it has in past years and also included the most important discovery of the year, Lane City Townsite field, Wharton County. The Yegua retained second place as it did in 1947, the most important discovery being the Buna field, Jasper County, which is the first production in the county. Oil was found in the Wilcox on an interior salt dome in Madison County, Day field, and a new Cretaceous producing zone for the district, Washita, was discovered in Trinity County.

Of the new discoveries 9 are credited to a combination of seismic and subsurface geology, 7 to seismic, and 6 to subsurface geology.

Lane City Townsite field, Wharton County, is probably the most important. Accumulation is caused by a small closure on the high side of a 400-foot up-to-the-coast fault. The producing zone is the upper sand member of the Frio section at 5,464 feet. Four producing wells have been completed. It appears that the producing area will be restricted to a rather small area.

Buna field, Jasper County, is important from a regional basis. This is the first oil produced in the county and was a subsurface trend play extending northeastward from the Silsbee field. Production is obtained from the Yegua sand at 7,459 feet. The discovery well was the only producer at the close of the year.

Peach Point field, Brazoria County, is producing from a lower Frio sand at 11,278 feet and is located on the flank of a domal uplift. Additional development is necessary before an estimate of reserves can be made.

East Hillister field, Tyler County, is located along the Wilcox trend. Location was made on a seismic structure. The discovery well is producing from the Wilcox at 8,260 feet.

Day field, Madison County, is an interior salt dome discovered in 1947. Oil was first discovered this year. Production is from the Wilcox at 1,903 feet. Production is small so far and of minor importance.

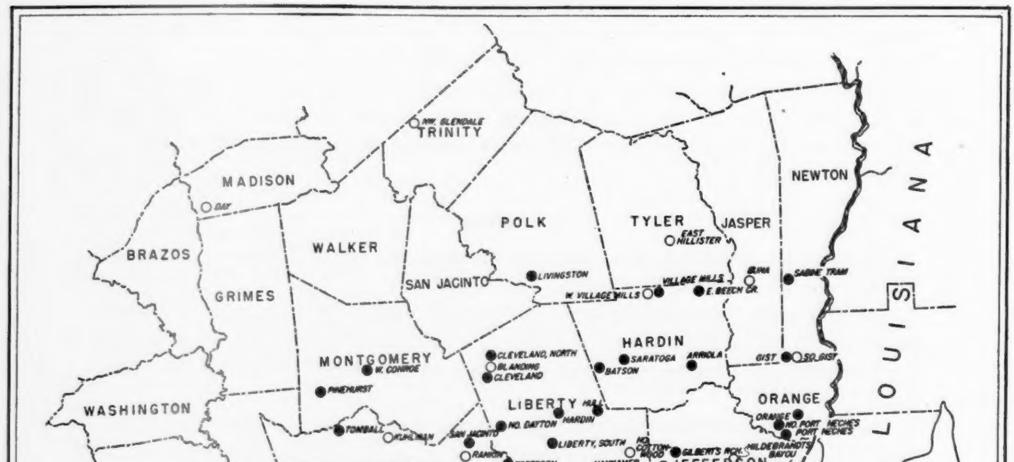
UPPER GULF COAST DISTRICT
OF TEXAS
1948 DISCOVERIES
LEGEND
NEW FIELDS
NEW SANDS, NEW RESERVOIRS AND EXTENSIONS IN OLD FIELDS, 1948
0 8 16 24 32 40
SCALE IN MILES
MADISON
TRINITY
BRAZOS
WALKER
POLK
TYLER
JASPER
NEWTON
LOUISIANA
GRIMES
SAN JACINTO
HARDIN
MONTGOMERY
WASHINGTON
LIBERTY
ORANGE
JEFFERSON
AUSTIN
WALLER
HARRIS
CHAMBERS
COLORADO
FORT BEND
BRAZORIA
WHARTON
MATAGORDA
MEXICO
OF
GULF

FIG. 1

NEW FIELDS DISCOVERED

IN

UPPER GULF COAST OF TEXAS, 1948

TABLE I

COUNTY AND FIELD	DISCOVERY WELL	COMPLETION DATE	COMPLETION DEPTH	I.P. B.P.D.	GRAVITY	PRODUCING HORIZON	TYPE PRODUCTION	BASIS FOR LOCATING WELL
BRAZORIA								
1. Peach Point	Gulf #1 S. S. Perry	12-20-48	Perf. 11278-348	50 3/16"ck 1050 MCF	55.0°	Frio	Condensate	Seismic
HARDIN								
1. West Village Mills	Houston Oil #1 Ho-Au Cherry Fee	8- 4-48	Perf. 7026-36	80 5/16"ck GOR 41788/1	41.0°	Crockett	Condensate	Seismic and Subsurface
HARRIS								
1. Rankin	Sun Oil #1 Bossier	3-31-48	Perf. 8252-57	21 8/64"ck GOR 8760/1	38.8°	Cockfield	Oil	Seismic and Subsurface
2. Kuhlman	Lamar Hunt Est. #1 Kuhlman	8- 5-48	Perf. 5875-79	41 5/32"ck GOR 553/1	38.0°	Cockfield	Oil	Seismic and Subsurface
3. Durkee	Union Prod. Co. #1 Homer Moore	4-23-48	Perf. 7705-10	24.8 1540 MCF	54.0°	Cockfield	Condensate	Subsurface
JASPER								
1. Buna	Placid Oil #1 Richardson	11- 9-48	Perf. 7459-69	154 10/64"ck GOR 5370/1	45.0°	Cockfield	Oil	Subsurface
JEFFERSON								
1. Hildebrandts Bayou	Jas. Morse & Co. #1 Talbot	7- 3-48	Perf. 7759-61	166 1/8"ck GOR 742/1	39.4°	Marginulina	Oil	Subsurface
2. South Nome	McCarthy #1 Wood	2- 9-48	Perf. 10446-54	26 2500 MCF	56.5°	L. Frio	Condensate	Subsurface
LIBERTY								
1. Blanding	Miles Prod. Co. #2 Blanding	8-31-48	Perf. 5924-30	48 5/16"ck GOR 93456/1	59.0°	Cockfield	Condensate	Subsurface
2. North Cottonwood	Hunt #1 Welch & Silva	8- 6-48	Perf. 7906-26	77.5 12/64"ck GOR 40800/1	56.0°	Frio	Condensate	Subsurface and Seismic
MADISON								
1. Day	Sun Oil #3 Day	8- 4-48	Perf. 1903-08	42 Pump	25.4°	Wilcox	Oil	Subsurface, Seismic and Gravity
MATAGORDA								
1. Arch	Rowan #1 Stovall	8-26-48	Perf. 6364-66	126 1/8"ck GOR 928/1	37.1°	Frio	Oil	Subsurface and Seismic
NEWTON								
1. South Gist	Am. Republics #1 Newton Co. Lbr. Co.	6-16-48	Perf. 7322-24	150 10000 MCF	54.3°	L. Frio	Condensate	Seismic
TRINITY								
1. N.W. Glendale	Humble O & R #1 Thompson Bros.	9- 7-48	Perf. 10310-20	50.8 1/4"ck 2690 MCF	57.0°	Washita	Gas	Seismic
TYLER								
1. E. Hillister	Humble O & R #1 Rice Institute	11- 8-48	Perf. 8260-70	77.9 3/16"ck 2080 MCF	59.0°	Wilcox	Condensate	Seismic
WHARTON								
1. Lane City Townsite	Sohio #1 Abbott	6-15-48	Perf. 5464-68	206 10/64"ck GOR 658/1	26.0°	Frio	Oil	Seismic and Subsurface
2. Allen	Smith & Donkin #1 Allen	9-20-48	Perf. 7187-92	170 ≠ 7% W 9/64"ck GOR 900/1	46.3°	Frio	Oil	Seismic
3. Egypt-Deep	Hamill #1 Duncan	3-20-48	Perf. 6720-26	100 3085 MCF	61.1°	Cockfield	Condensate	Subsurface and Seismic
4. Hawes	Hunt Oil #1 Hawes, Jr.	12-10-48	Perf. 5199-5202	1250 MCF 5/32"ck	-	Frio	Gas	Seismic
5. Mach	Smith & Donkin #1 Mach	7-22-48	Perf. 6775-6834	3245 MCF 1/4"ck	-	Frio	Gas	Subsurface and Seismic
6. E. Magnet	Hunt Oil #1 Prasifka	12-10-48	Perf. 5809-15	10 5/32"ck GOR 140000/1	-	Frio	Gas	Seismic
7. West Louise	Harrison #2 Stockton	10- 8-48	Perf. 4077-84	35 5/64"ck GOR 1260/1	24.1°	Frio	Oil	Subsurface

NEW SANDS, NEW RESERVOIRS AND EXTENSIONS

DISCOVERED IN UPPER GULF COAST IN 1948

TABLE II

COUNTY AND FIELD	COMPANY AND WELL	COMPLETION DATE	COMPLETION DEPTH	I.P. B.P.D.	GRAVITY	PRODUCING HORIZON	TYPE PRODUCTION	CLASSIFICATION
AUSTIN 1. New Ulm	Gulf #1 Lesikar	3-11-48	Perf. 9612-18	43.6 1/8"ck GOR 20020/1	38.0°	Wilcox	Condensate	New Sand
BRAZORIA 1. Chenango	Pan American #1 Joe Heim, Jr.	2-13-48	Perf. 9200-06	132 10/64"ck GOR 2845/1	29.7°	Frio	Oil	New Reservoir
2. Chenango	Pan American #1 Hawrocki	5- 4-48	Perf. 8954-65	127 14/64"ck GOR 948/1	31.6°	Frio	Oil	New Sand
3. Chenango	Pan American #1 Walker	5-16-48	Perf. 8491-97	66 10/64"ck GOR 35378/1	44.9°	Frio	Condensate	New Sand
4. Bailey's Prairie	Pan American #1 Munson	3-10-48	Perf. 10854-880	36 + 60W 7/64"ck 822,712 Gas	43.3°	Frio	Condensate	New Sand
5. Damon Mound	The Texas Company #1 Conoco Fee	12-28-48	Perf. 3966-74	2250 MCF	-	Frio	Gas	New Reservoir
6. Damon Mound	General Crude #12 Belle Wisdom	12- 1-48	Perf. 3160-76	96 1/8"ck GOR 212/1	34.9°	Frio	Oil	New Sand
7. Manvel	Salt Dome #2 C.W.Way	6-24-48	Perf. 5786-5800	78.6 12/64"ck (60% W)	26.0°	Frio	Oil	New Sand
8. Chocolate Bayou	Phillips Petroleum #1 Alibel	6-26-48	Perf. 9333-48	334.64 9/64"ck GOR 517/1	41.0°	Frio	Oil	New Sand
9. Chocolate Bayou	Stanolind #1 Ed Boyles	11- 6-48	Perf. 11537-49	32 + 86W 1/4"ck GOR 12252/1	40.4°	Frio	Condensate	Extension
10. Chocolate Bayou	Phillips Petroleum #1-H Houston Farms	10-17-48	Perf. 11024-50	209 1/4"ck 70000 MCF	46.1°	Frio	Condensate	Extension
11. Chocolate Bayou	Phillips Petroleum #1 Gewil	5-24-48	Perf. 10840-60	248 1/4"ck GOR 18924/1	45.9°	Frio	Condensate	Extension
12. Danbury	Humble O & R #1 Robertson	5- 6-48	Perf. 7971-76	3053 MCF 1/4"ck	-	Frio	Gas	New Reservoir
13. Danbury	Humble O & R #1 Chovanec	11-17-48	Perf. 8310-37 8357-87	61 1/4"ck 4865 MCF	52.6°	Frio	Condensate	New Reservoir
14. Danbury	Humble O & R #4 So. Texas Rice Prod.	2-20-48	Perf. 9270-78	548 MCF 1/4"ck	-	Frio	Gas	New Reservoir
15. Danbury	Humble O & R #10-B Moller	11-20-48	Perf. 6577-90	166 GOR 1872/1	38.7°	Frio	Oil	New Sand
16. West Columbia	The Texas Company #26 Phillips	4-14-48	Perf. 6202-07	359 1/4"ck GOR 347/1	31.5°	Frio	Oil	New Sand
17. West Columbia	The Texas Company #32 Phillips	7-20-48	Perf. 6676-6706	162.39 1/4"ck GOR 317/1	28.0°	Frio	Oil	New Sand

NEW SANDS, NEW RESERVOIRS AND EXTENSIONS
DISCOVERED IN UPPER GULF COAST IN 1948

COUNTY AND FIELD	COMPANY AND WELL	COMPLETION DATE	COMPLETION DEPTH	I.P. B.P.D.	GRAVITY	PRODUCING HORIZON	TYPE PRODUCTION	CLASSIFICATION
BRAZORIA (CONT'D.) 18. West Columbia	The Texas Company #53 Abrams		Perf. 5542-46 5552-62 5563-71	226 10/64"ck GOR 810/1	28.6°	Marginulina	Oil	(OWWO Dual Comp.) New Sand
19. West Columbia	Hogg Oil #1 Smith	7-16-48	Perf. 3710-24	1830 MCF 1/4"ck	-	Miocene ?	Gas	New Sand
20. West Columbia	The Texas Company #24 Abrams	10-18-48	Perf. 5166-74	226 5/32"ck	28.7°	Marginulina	Oil	New Sand
21. Old Ocean	Magnolia & Abercrombie #1 Warner	8-20-48	Perf. 11164-70	4533 MCF 30/64"ck GOR 37990/1	49.8°	Frio	Condensate	Extension
22. Old Ocean	Magnolia & Abercrombie #1 Bausman	9-14-48	Perf. 10721-30	149 18/64"ck 6087 MCF	52.0°	Frio	Condensate	Extension
23. Old Ocean	Magnolia & Abercrombie #1 A.H.Smith	1-31-48	Perf. 11030-47	267 40/64"ck GOR 121435/1	47.9°	Frio	Condensate	Extension
24. Blue Lake	McCarthy O & G #1 Niedringhaus	8-28-48	Perf. 11016-32	28 1/4"ck 1993 MCF	37.5°	Frio	Condensate	New Sand
CHAMBERS 1. South Mayes	Humble #1 South Mayes Unit	4-30-48	Perf. 12021-026	464 1/8"ck GOR 11650/1	47.8°	L. Frio	Condensate	New Sand
2. Anahuac	Humble #1-C Tyrell	5-10-48	Perf. 8728-45	43 3/16"ck GOR 2750/1	43.5°	Frio	Condensate	New Reservoir
3. Anahuac	Humble #1 Rearwin	8-10-48	Perf. 8814-38	219.6 9/64"ck 7200 MCF	54.8°	Frio	Condensate	New Reservoir
4. Jergins	The Texas Company #8 Schilling	6-17-48	Perf. 6345-50	65 7/64"ck GOR 7780/1	35.0°	Frio	Oil	New Sand
5. Cedar Point	Humble O & R #7 State Tract #127	8- 9-48	Perf. 6058-84	70 1/8"ck GOR 4220/1	35.0°	Frio	Oil	New Reservoir
6. Cedar Point	Humble O & R #10 State Tract #126	10- 6-48	Perf. 6138-44	5 1/8"ck 536 MCF	60.3°	Frio	Gas	New Reservoir
7. Cedar Point	Humble O & R #11 State	12-29-48	Perf. 7307-30	18 1/8"ck 1197 MCF	55.7°		Condensate	New Reservoir
8. Jackson Pasture	McCarthy O & G #3 State Galveston Bay Sec. 41	3- 9-48	Perf. 8158-88	50 7/64"ck GOR 80000/1	55.0°	Frio	Condensate	Extension
COLORADO 1. Glasscock	Coast Oil #1 Glasscock	10-26-48	Perf. 9250-60) 9285-90)	75 3/16"ck GOR 850/1	44.7°	Wilcox	Oil	New Sand
			9492-99) 9529-46)	121 5/32"ck GOR 3600/1	41.2°	Wilcox	Oil	Dual Comp.

NEW SANDS, NEW RESERVOIRS AND EXTENSIONS
DISCOVERED IN UPPER GULF COAST IN 1948

COUNTY AND FIELD	COMPANY AND WELL	COMPLETION DATE	COMPLETION DEPTH	I.P. B.P.D.	GRAVITY	PRODUCING HORIZON	TYPE PRODUCTION	CLASSIFICATION
FORT BEND 1. Big Creek	Gulf #80 Davis	10-24-48	Perf. 4078-90	179 1/8"ck GOR 525/1	38.6°	Frio	Oil	New Sand
2. Boling	Sparta #2 Taylor	9-20-48	Perf. 5308-14	154 10/64"ck GOR 560/1	28.0°	Frio	Oil	New Sand ?
3. Blue Ridge	Swiss Oil #1-B Davison	10- 9-48	Perf. 4438-48	138 9/64"ck GOR 200/1	33.7°	Frio	Oil	New Sand
4. Needville	Union Prod. #1 Socaris	7-24-48	Perf. 6117-26 4596-4640	1255 MCF 11/64"ck 1087 MCF 10/64"ck		Frio	Gas	New Reservoir Dual Comp.
5. Needville	Karsten #1 Petrusek	2-19-48	Perf. 6311-14	207 1/8"ck GOR 1920/1	30.0°	Frio	Oil	New Reservoir
6. Needville	Goldruss #1 Hartfield	1-13-48	Perf. 4630-44	1500 MCF 3/16"ck		Frio	Gas	New Reservoir
GALVESTON 1. Dickinson	Humble O & R #1-B Bayou Dev. Co.	8-26-48	Perf. 9646-53	205 1/8"ck GOR 612/1	43.7°	Frio	Oil	New Sand
2. League City	Phillips Petroleum #1 Duggan	2-19-48	Perf. 10614-32	5-1/2 3750 MCF	50.7°	Frio	Gas	New Sand OWWO
3. South Gillock	Pan American #1 Nunez	3-18-48	Perf. 8956-66	321 14/64"ck GOR 2207/1	39.5°	Frio	Oil	New Sand
4. South Gillock	Pan American #1-C Kohfeldt	8-25-48	Perf. 8996-9006	206 14/64"ck GOR 2620/1	38.4°	Frio	Oil	Extension
5. High Island	Mecom #11-A Cade	8-28-48	Perf. 7222-28	163 10/64"ck GOR 625/1	37.8°	Frio	Oil	Extension
HARDIN 1. Batson	Progress Pet. #2 Myrtle Jordan	9-15-48	Perf. 5046-64	41 10/64"ck GOR 480/1	42.0°	Yegua	Oil	New Sand
2. Batson	Hawkins & Graham #3 Hooks	9-22-48	Perf. 6178-84	122 5/32"ck GOR 877/1	38.7°	Yegua	Oil	New Sand
3. Batson	Hawkins & Graham #2 Hooks	4-20-48	Perf. 6245-47	93 1/8"ck GOR 321/1	38.6°	Yegua	Oil	New Sand
4. Batson	Hawkins & Graham #1 Pyle	1-14-48	Perf. 5419-25	10 12/64"ck 643 MCF	57.0°	Yegua	Condensate	Extension
5. Saratoga	Falcon-Seaboard #2 Bashara	3- 5-48	Perf. 7198-7220 7240-7318	127 10/64"ck GOR 607/1	35.0°	Yegua	Oil	Extension
6. Saratoga	Cities Service #7 Kariker Lbr.	4-15-48	Perf. 5064-5110	248 13/64"ck GOR 555/1	38.7°	Yegua	Oil	New Sand
7. Saratoga	Gulf #1 A. R. Teol	12-10-48	Perf. 4446-70	101 9/64"ck GOR 570/1	36.7°		Oil	New Sand
8. North Beech Creek	American Republics #4 Sternberg	9- 8-48	Perf. 5424-30 6212-13	124 1/8"ck GOR 602/1 97 1/8"ck GOR 498/1	39.4° 43.1°	Yegua Yegua	Oil Oil	New Sand Dual Comp.

NEW SANDS, NEW RESERVOIRS AND EXTENSIONS
DISCOVERED IN UPPER GULF COAST IN 1948

COUNTY AND FIELD	COMPANY AND WELL	COMPLETION DATE	COMPLETION DEPTH	I.P. B.P.D.	GRAVITY	PRODUCING HORIZON	TYPE PRODUCTION	CLASSIFICATION
HARDIN (CONT'D.)								
9. East Beech Creek	American Republics #1 H & TC Fee	2-26-48	Perf. 6653-57	86 ≠ 35W GOR 626/1 1/8"ck	40.0°	Yegua	Oil	New Sand
10. East Beech Creek	American Republics #2 H & TC Fee	4-17-48	Perf. 6711-14	154 GOR 649/1 1/8"ck	38.5°	Yegua	Oil	New Sand
11. Village Mills	Houston Oil #2 Rice Institute	2- 2-48	Perf. 9025-37	84 GOR 523/1 10/64"ck	35.3°	Wilcox	Oil	New Sand
12. Village Mills	Houston Oil #1 Houston-Amer.	8- 2-48	Perf. 8944-80	70 GOR 52778/1 5/16"ck	61.0°	Wilcox	Condensate	New Sand
13. Village Mills	Houston Oil & Amer. Rep. #1 Kirby Lumber	9-27-48	Perf. 7026-34	25 3458 MCF 1/4"ck	-	Yegua	Condensate	New Sand
14. Arriola	Houston Oil #14 Arriola Fee	7-30-48	Perf. 2300-10	761 MCF 3/16"ck	-	?	Gas	New Sand OWDD
HARRIS								
1. North Delhi	Cities Service #1 Rorick	6-20-48	Perf. 7252-63 7274-80	39.6 2785 MCF 1/4"ck	53.2°	Yegua	Condensate	New Sand
			7050-56	18 1152 MCF 1/4"ck	54.6°			
2. Hockley	Magnolia #7 Warren	7-19-48	Perf. 3063-66	168 GOR 182/1 12/64"ck	25.6°	Miocene	Oil	New Reservoir
3.Clinton	Stanolind #2-A Moody	8-1- 48	Perf. 8002-16	13 1150 MCF OF	45.9°	Yegua	Condensate	New Sand
4. Durkee	Houston Oil #1 Hofer	10-10-48	Perf. 7177-83	14 760 MCF 3/32"ck	60.3°	Yegua	Condensate	New Sand
5. Durkee	Union Prod. #1 Langtry	11- 3-48	Perf. 7085-90	140 9/64"ck	35.6°	Yegua	Oil	New Sand OWWO
6. Tomball	Humble #4 Hemple	9- 1-48	Perf. 8369-95	666 MCF 1/8"ck	-	Wilcox	Gas	New Sand
7. North Houston	Union Prod. #1 Allen	10-12-48	Perf. 7084-87	58000 MCF	-	Yegua	Gas	New Sand
8. Bammel	Grubb & Hawkins #1 Rogers	4-29-48	Perf. 6420-24	38 GOR 300/1 20/64"ck	32.2°	Yegua	Oil	New Reservoir
9. San Jacinto	Houston Oil #3 Elkins	2-18-48	Perf. 8506-18	32 1423 MCF 12/64"ck	53.0°	Yegua	Condensate	Extension
10. Pierce Junction	Wallace #1 Settegast	11- 5-48	Perf. 7181-87	71 GOR 100/1 1/4"ck	23.0°	Vicksburg	Oil	Extension
11. Aldine	Union Prod. #1 Gillespie	8-24-48	Perf. 7696-7710	45 3069 MCF 1/4"ck	53.4°	Yegua	Condensate	New Reservoir
JEFFERSON								
1. Stowell	Brown #1 Stephens	7-26-48	Perf. 5462-68	1795 MCF 12/64"ck	-	Miocene	Gas	New Sand
2. Fannett	Gulf #3-A Jackson	3- 9-48	Perf. 11045-053	73.56 6220 MCF 10/64"ck	47.0°	L. Frio	Condensate	New Reservoir

NEW SANDS, NEW RESERVOIRS AND EXTENSIONS
DISCOVERED IN UPPER GULF COAST IN 1948

COUNTY AND FIELD	COMPANY AND WELL	COMPLETION DATE	COMPLETION DEPTH	I.P. B.P.D.	GRAVITY	PRODUCING HORIZON	TYPE PRODUCTION	CLASSIFICATION
JEFFERSON (CONT'D.) 3. Gilbert Ranch	Merrideth et al #1 Gilbert	1-15-48	Perf. 8685-91	2680 MCF 72 1/4"ck	59.1°	Frio	Condensate	New Sand
4. La Belle	Continental #1 Ward	2-26-48	Perf. 8130-72	2-1/2 10/64"ck 1712 MCF	47.0°	Frio	Condensate	New Reservoir
LIBERTY 1. South Liberty	Josey #4 Mitchel	4- 2-48	Perf. 6111-46	295 10/64"ck GOR 1200/1	39.0°	Yegua	Oil	New Sand
2. South Liberty	Woodward #1 Deussen	5-26-48	Perf. 5022-30	121 10/64"ck GOR 500/1	35.8°	Yegua	Oil	New Reservoir
3. South Liberty	Josey #6 Mitchel	5-28-48	Perf. 6291-6321	290 1/8"ck GOR 710/1	38.8°	Cook Mt.	Oil	New Sand
4. South Liberty	Karsten #2 Mitchel	6-15-48	Perf. 6404-32	215 8/64"ck GOR 823/1	40.7°	Cook Mt.	Oil	New Sand Dual Comp.
			5830-68	287 12/64"ck GOR 987/1	37.2°	Yegua	Oil	
5. South Liberty	Maceo et al #1 Richardson	8-24-48	Perf. 4430-34	91.8 7/64"ck GOR 800/1	36.1°	Frio ?	Oil	New Sand
6. South Liberty	Karsten #4 Mitchel	9-14-48	Perf. 6716-62	293 10/64"ck GOR 947/1	35.6°	Yegua	Oil	New Sand Dual Comp.
			7534-62	259 10/64"ck GOR 829/1	36.8°			
7. South Liberty	Josey #5 Mitchel	5- 1-48	Perf. 5548-88	270 10/64"ck GOR 939/1	39.5°	Yegua	Oil	New Sand
8. South Liberty	Gulf #1 Sidney Smith	11- 6-48	Perf. 8562-8600	254 9/64"ck GOR 695/1	38.9°	Yegua	Oil	New Reservoir
9. Kirby	General Crude #18-B Welch	9-16-48	Perf. 6428-36	113 1/8"ck GOR 420/1	19.5°	Vicksburg	Oil	New Reservoir
10. Hankamer	Gulf #1-C Evans	9- 3-48	Perf. 1996-2010	37 + 50% W	19.8°	Miocene	Oil	New Reservoir
11. Hankamer	R. Olson #A-4 Ezzell		Perf. 2692-2702	37 GOR 90/1	21.0°	Yegua	Oil	New Sand OWWO
12. Hankamer	McCarthy & Sun #1 W.M.Crook	12-29-48	Perf. 8294-8304	4000 MCF 1/4"ck Small amt. Dist.	36.1°	Wilcox ?	Condensate	New Reservoir
13. Hankamer	Gulf #30 Boyt	10-19-48	Perf. 3142-50	8	21.6°	Yegua ?	Oil	New Sand
14. Hardin	Humble #1 Finley	12-24-48	Perf. 7790-7800	144 3/16"ck GOR 10300/1	29.0°	Frio	Oil	New Reservoir
15. Esperson	General Crude #1 Pure Oil Co.	3- 6-48	Perf. 8875-8915	55 1/8"ck	37.5°	Yegua	Oil	New Sand
16. Hull	Gulf #23 Scarborough	6- 2-48	Perf. 5892-5916	227 3/16"ck GOR 910/1	35.4°	Yegua	Oil	New Sand

NEW SANDS, NEW RESERVOIRS AND EXTENSIONS

NEW SANDS, NEW RESERVOIRS AND EXTENSIONS
DISCOVERED IN UPPER GULF COAST IN 1948

COUNTY AND FIELD	COMPANY AND WELL	COMPLETION DATE	COMPLETION DEPTH	I.P. B.P.D.	GRAVITY	PRODUCING HORIZON	TYPE PRODUCTION	CLASSIFICATION
LIBERTY (CONT'D.) 17. Hull	The Texas Company #2 Moore	9-28-48	Perf. 5716-26 5734-46	23.54 10/64"ck GOR 150/1	33.6°	Yegua	Oil	New Sand
18. North Dayton	The Texas Company #2 Deering	6- 4-48	Perf. 7510-16	18 MMCF 10/64"ck	-	Yegua	Gas	New Sand
19. Cleveland	Gulf #23-C Kirby Lbr. Corp.	6- 2-48	Perf. 5676-94	75 9/64"ck GOR 1850/1	40.4°	Frio	Oil	New Reservoir
20. North Cleveland	A. O. Phillips #1 Hills	2-28-48	Perf. 5687-92	141 10/64"ck GOR 1163/1	41.0°	Frio	Oil	New Reservoir
MATAGORDA 1. Whitson	Stanolind #3 Anderson	2-15-48	Perf. 8570-75	182 1/8"ck GOR 737/1	38.0°	Frio	Oil	New Sand
2. Sugar Valley	Humble #1-B Taylor	4-19-48	Perf. 10083-132	2.7 4/64"ck GOR 96374/1	37.9°	Frio	Condensate	New Sand
3. Sugar Valley	Sun-Skelly #1 Gregg Lawrence	3-27-48	Perf. 8751-54	92 7/64"ck GOR 815/1	33.4°	Frio	Oil	Extension
4. Sugar Valley	Superior #4-A Culberton	4-20-48	Perf. 9750-55	211 10/64"ck	29.5°	Frio	Oil	New Sand
5. Sugar Valley	Skelly #4 Robertson	10-19-48	Perf. 9304-08	233 9/64"ck		Frio	Oil	New Sand OWWO
6. Sugar Valley	Skelly #5 Robertson	11-16-48	Perf. 9226-40	113 7/64"ck		Frio	Oil	New Sand OWWO
7. Sugar Valley	Humble #3 Taylor	11- 5-48	Perf. 10134-38	51.49 1/4"ck GOR 2850/1	28.4°	Frio	Oil	New Sand
8. East Bay City	Skelly #1 Jones	1- 5-48	Perf. 10096-124 10144-166	46 1/4"ck 5625 MCF	42.1°	L. Frio	Condensate	Extension
9. East Bay City	Skelly #1 Millican	7- 3-48	Perf. 10350-72	7-1/2 1/8"ck GOR 207000/1	42.3°	Frio	Condensate	Extension
10. Arch	Rowan #1 Kountz	10- 5-48	Perf. 6242-48	151 1/8"ck GOR 1072/1	34.2°	Frio	Oil	New Sand
11. Collegeport	Gulf #1 Pierce	8-20-48	Perf. 4094-4117	4100 MCF 1/4"ck	-	Miocene	Gas	Extension
MADISON 1. Day	Sun Oil #1 Cleere		Perf. 2371-72	25 Pump	22.8°	Wilcox	Oil	New Sand
MONTGOMERY 1. West Conroe	Patillo #1 Calfee	5-18-48	O.H. 4610-14	160 10/64"ck GOR 710/1	30.7°	Yegua	Oil	Extension
2. Pinehurst	Gray Wolf #3 Pan Am. Unit	3-15-48	Perf. 9790-9800 9580-90	86.36 1827 MCF	54.3°	Wilcox	Condensate	New Sand
				104.6 1858 MCF	56.9°	Wilcox	Condensate	Dual Comp.
3. Pinehurst	Superior #1-A Dean	4-16-48	Perf. 10175-220 10828-50	13 3/4"ck 1300 MCF	42.4°	Wilcox	Condensate	New Sand
				52.5 12/64"ck 1240 MCF	49.7°	Wilcox		Dual Comp.

NEW SANDS, NEW RESERVOIRS AND EXTENSIONS
DISCOVERED IN UPPER GULF COAST IN 1948

COUNTY AND FIELD	COMPANY AND WELL	COMPLETION DATE	COMPLETION DEPTH	I.P. B.P.D.		GRAVITY	PRODUCING HORIZON	TYPE PRODUCTION	CLASSIFICATION
NEWTON 1. Gist	Standard of Texas #1 Peters	1- 7-48	Perf. 7196-97	151 GOR 391/1	1/8"ck	38.6°	L. Frio	Oil	New Sand
2. Gist	Brown & Standard of Texas #1 Hankamer		Perf. 5872-74	105	1/8"ck	?	Frio	Oil	New Sand OWWO
3. Gist	Houston Oil #1 Newton County Lbr. Co.	7-28-48	Perf. 7556-80	5932 MCF	5/16"ck	-	L. Frio	Gas	New Sand
4. Sabine Tram	Gulf #1-C Bevil	3-12-48	Perf. 7366-70	60 + 59 W GOR 7040/1	1/8"ck	43.1°	Yegua	Oil	New Sand
5. Sabine Tram	Gulf #2-C Bevil	4- 2-48	Perf. 7785-89	38 + 285 W	1/4"ck	36.0°	Yegua	Oil	New Sand
ORANGE 1. North Port Neches	Gulf #1 Todd, Jr.	6-19-48	Perf. 8420-50	164.5 GOR 40400/1	1/4"ck	57.0°	L. Frio	Condensate	New Reservoir
2. North Port Neches	Gulf #1 Kyle	7-25-48	Perf. 8980-90	180.5 4000 MCF		47.7°	L. Frio	Condensate	New Reservoir
3. North Port Neches	Smith Exp. #1 Pattillo-Marshall	11- 5-48	Perf. 8792-94	105 GOR 654/1		37.4°	L. Frio	Oil	Extension
4. North Port Neches	Gulf #2 Todd, Jr.	11-20-48	Perf. 8484-8634	39 5020 MCF	16/64"ck	51.4°	L. Frio	Condensate	New Sand
5. Port Neches	Shell #2 Southern Pet. Co.	10- 8-48	Perf. 9126-30	37	1/8"ck	45.0°	L. Frio	Oil	New Reservoir
6. Orange	Placid Oil #1 Winfree	7- 8-48	Perf. 7710-15	320 GOR 556/1	10/64"ck	41.8°	Frio	Oil	New Reservoir
POLK 1. Livingston	Hawkeye #1 Howard	4- 6-48	Perf. 3403-50	39	1/4"ck	?	Hockleyensis	Oil	New Sand
WALLER 1. Katy	Houston Oil #1 Harris	1- 8-48	Perf. 6871-73	46.8 GOR 938/1	5/64"ck	41.0°	Yegua	Oil	Extension
WHARTON 1. Lakeview	McDannald #1 Crenshaw	4-30-48	Perf. 3194-3210	4142 MCF	3/8"ck	-	Miocene	Gas	New Sand
2. Boling	British American #1 Moore	7- 1-48	Perf. 3762-69	114 GOR 185/1	8/64"ck	23.0°	Frio ?	Oil	New Reservoir
3. Hutchins	Adams & Haggarty #1 Meek	1- 7-48	Perf. 3205-3211	411 MCF	1/4"ck	-	Miocene	Gas	New Sand
4. South Hutchins	McDannald #8 Martin	7-15-48	Perf. 5622-32	68 GOR 600/1	6/64"ck	34.0°	Frio	Oil	New Sand
5. Twin Basin	Karsten #1 Ellis	1-17-48	Perf. 6586-97	S.I. Gas		-	Frio	Gas	New Sand
6. Spanish Camp	Houston Oil #1 Menefee	5- 9-48	Perf. 3150-64 2980-98	1800 MCF 1500 MCF	1/4"ck 1/4"ck	- -	Miocene	Gas	Extension Dual Comp.
7. Spanish Camp	Houston Oil #1 Northington	7- 1-48	Perf. 3018-36	1590 MCF	1/4"ck	-	Miocene	Gas	Extension
8. Egypt Deep	Hamil #2 Duncan	10-13-48	Perf. 7160-64	37 GOR 30000/1	1/4"ck	53.9	Yegua	Condensate	New Sand

Northwest Glendale field, Trinity County, is important for adding a new Cretaceous producing formation, the Washita, to the district. The discovery well was completed in Washita limestone at 10,310 feet. Production is small. This zone will be limited to the northern part of the district.

Arch field, Matagorda County, has been disappointing. This field is a small closure on which 2 wells have been drilled, 2 producers, and 2 dry holes. The discovery well is producing from a Frio sand at 6,364 feet and an offset well is producing from a different Frio sand at 6,242 feet.

Wharton County had the most discoveries, 7 in number. All of these, with the exception of Lane City Townsite, consist of one or two producing wells.

DEVELOPMENT IN OLD FIELDS

This classification includes all important exploratory wells drilled on known structures. Many more reserves were added from this source than from all new fields combined.

In all, 902 wells were drilled which resulted in the discovery of 31 new reservoirs, 77 new sands, and 22 important extensions. The most active fields were Chocolate Bayou and Old Ocean, Brazoria County; South Liberty, Liberty County, and Port Neches, Orange County. Several important new reservoirs, new sands and extensions were discovered in these fields. Important new reservoirs, new sands and extensions were also found at Anahuac, Chambers County; Cedar Point, Chambers County; Danbury, Brazoria County; West Columbia, Brazoria County; South Gillock, Galveston County; Batson, Hardin County; North Dayton, Liberty County; and Sugar Valley, Matagorda County.

The deepest producing well in the district was completed in the South Mayes field, Chambers County. Production is from the lower Frio at 12,021–12,026 feet.

Field development was active on all types of structures. More success was obtained on old piercement salt domes and it was the discovery of these new fault segments and new sands which contributed most of the new reserves during 1948.

DEVELOPMENT IN GULF OF MEXICO

Two wildcat wells were completed as dry holes in the Gulf of Mexico off the Texas Coast in 1948. One of these is believed to have discovered a new salt dome 18 miles southeast of Galveston. The other was drilled about 3 miles southeast of the southwestern end of Matagorda Peninsula and was abandoned at the total depth of 8,229 feet. At the close of the year four wells were drilling in the Gulf off the Texas Coast.

At present exploration work is restricted to leased areas. There were 369,665 acres under lease to ten companies at the close of 1948. When the present exploration restrictions are lifted, considerable increase in water exploration will take place.

EXPLORATORY METHODS AND RESULTS

The reflection seismograph used in conjunction with subsurface geology was the most successful exploration method used.

Forty reflection seismic parties were operating at the close of the year as compared with 35 at the beginning of the year. Five of these were operating on leases in the Gulf of Mexico. Gravity-meter work declined from 12 parties at the first of the year to 10 at the close of the year. Four of these parties were operating in the Gulf. One air-borne magnetometer started operating over the Gulf at the end of the year.

The areas of most seismic activity were the Miocene and Frio trends throughout Brazoria, Matagorda, Wharton, and Galveston counties. Exploration was increasing along the Yegua and Wilcox trends in Lavaca, Colorado, Waller, Montgomery, Libery, Hardin, Tyler, Jasper, and Newton counties.

Much credit for the discovery of new reservoirs, new sand, and extensions to both old and new fields was due to careful subsurface geology.

Very little core drilling or surface geology was done in the district during 1948.

TRENDS IN EXPLORATION

It appears that there will be some decrease in drilling activity during 1949. There will probably be a slight increase in wildcat operations. If the present exploration restrictions in the Gulf of Mexico are lifted, an increase in water work will probably take place.

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DEVELOPMENTS IN LOUISIANA GULF COAST IN 1948[1]

WILLIAM McBEE, JR., AND PAUL J. ORCHARD[2]
New Orleans, Louisiana

ABSTRACT

During 1948, 803 tests were drilled in the South Louisiana district. Of these, 129 or 16.1 per cent were rank wildcat exploratory tests and 674 or 83.9 per cent were field development tests. The 129 rank wildcat tests resulted in the discovery of 28 new fields. All successful field exploratory wells are classified as follows: new-pool wells, 29; shallower-pool wells, 3; deeper-pool wells, 8; and outpost wells, 38.

Of the 674 field development tests, 463 or 68.9 per cent were successful and 211 were failures. There was an increase of 24.3 per cent in the number drilled in 1948 over 1947.

The 28 new field discoveries include 13 oil fields, 11 condensate fields, and 4 gas fields. Of great significance is the fact that 7 of the new fields were discovered in the open waters of the Gulf of Mexico, 3 of which are oil fields, 2 condensate fields, and 2 gas fields.

Seismograph operations are credited with having led to 22 of the new-field discoveries, subsurface led to 2, and a combination of seismograph and subsurface was responsible for the remaining 4.

The small decrease in the number of seismograph crews operating in offshore waters was equalized by an increase in the number of inshore crews. The number of gravity-meter crews operating in the offshore areas decreased almost to zero during the year. This appears to indicate a general decline in offshore geophysical exploratory and reconnaissance activities. The number of land gravity meter crews increased to a maximum in the summer months and then decreased during the remainder of the year.

The most significant exploratory activity in 1948 was made in the offshore Miocene trend. There has been a noticeable increase in geophysical and leasing activities in the area northeast of the Mississippi River.

INTRODUCTION

Drilling reached an all-time high in the Louisiana Gulf Coast district during 1948, with a total of 803 tests being made. This is an increase of 24.3 per cent over 1947, and 17.4 per cent over 1946. Of the 129 rank wildcat exploratory tests that were drilled, 28 resulted in the discovery of new fields, the largest number ever made in any preceding year. Of all successful field exploratory wells, 29 resulted in the discovery of new pools, 7 resulted in the discovery of deeper pools, 3 resulted in the discovery of shallower pools, and 38 were completed as field extensions. These are shown in Tables III, IV, V, and VI, respectively. Of the 674 development tests, 463 or 68.9 per cent were successful.

A break-down of all the tests drilled in the district is shown in Table I. Many of the data used in compiling the tables were furnished by the committee on statistics of exploratory drilling and are presented in this paper with minor revisions. These revisions were based on more detailed information not readily available to the committee.

NEW-FIELD DISCOVERIES

The data relative to the new field discoveries are shown in Table II, and the geographic locations are shown in Figure 1. The map shows that the discoveries

[1] Manuscript received, March 16, 1949.

[2] Geologists, The California Company.

The writers wish to acknowledge with thanks the data furnished by the various district geologists of the companies operating in the area, and especially to the Committee on Statistics of Exploratory Drilling for the wealth of information which was used in the preparation of this paper.

TABLE I

		EXPLORATORY TESTS						DEVELOPMENT TESTS					
	Total Wells Drilled	Total Explor. Wells	Total Successful	No. Oil	No. Cond.	No. Gas	Total Unsuccessful	Total Development	Total Successful	No. Oil Wells	No. Cond.	No. Gas	Total Unsuccessful
Acadia	74	9	1		1		8	65	50	37	11	2	15
Allen	4	3					3	1	1		1		
Ascension	2							2	1		1		1
Assumption	7							7	2	1	1		5
Avoyelles	21	5	1	1			4	16	13	13			3
Beauregard	47	13	5	4	1		8	34	23	22	1		11
Calcasieu	57	9	2		2		7	48	35	30	3	2	13
Cameron	32	10	2		1	1	8	22	11	8	3		11
East Baton Rouge	10	2					2	8	5	5			3
East Feliciana	0												
Evangeline	23	2					2	21	15	12	3		6
Iberia	31	1					1	30	18	17		1	12
Iberville	24	4	1	1			3	20	15	15			5
Jefferson	38	1	1		1			37	27	24	35		10
Jefferson Davis	21	3	1	1			2	18	11	5	6		7
Lafayette	3	2					2	1	1	1			
LaFourche	85	8					8	77	61	54	6	1	16
Livingston	1	1					1						
Orleans	2	2					2						
Plaquemines	36	1	1		1			35	30	28	2		5
Pointe Coupee	5	3	2	1	1		1	2					2
Rapides	3	2					2	1					1
St. Bernard	0												
St. Charles	9							9	5	4	1		4
St. Helena	0												
St. James	7	1					1	6	3	1	2		3
St. John	0												
St. Landry	44	8	1		1		7	36	25	15	8	2	11
St. Martin	40	2					2	38	28	27	1		10
St. Mary	51	7	1			1	6	44	36	35			8
St. Tammany	0												
Tangipahoa	0												
Terrebonne	79	10	2	2			8	69	27	21	5	1	42
Vermilion	25	4					4	21	16	3	12	1	5
Vernon	1	1					1						
Washington	1	1					1						
West Baton Rouge	1	1					1						
West Feliciana	0												
Total South Louisiana	784	116	21	10	9	2	88	658	459	338	70	11	209
Bay Marchand Area	0												
Breton Sound Area	1	1	1			1							
Chandeleur Sound Area	0												
East Cameron Area	0												
Eugene Island Area	4	4	1			1	3						
Grand Isle Area	3	2	2	2				1	1	1			
Main Pass Area	3	2	1	1			1	1	1	1			
Ship Shoal Area	4	1	1		1			3	1	1			2
South Pass Area	0												
South Pelto Area	0												
South Timbalier Area	0												
Vermilion Area	2	1	1		1			1	1		1		
West Delta Area	2	2					2						
West Cameron Area	0												
Total Gulf of Mexico	19	13	7	3	2	2	6	6	4	3	1	0	2
TOTAL	803	129	28	13	11	4	94	674	463	781	71	11	211

TABLE II NEW FIELD DISCOVERIES

New Field	Parish	Operator	Well-Farm	Location	Formation	Producing Depth	Type	Remarks
Bay Junop	Terrebonne	Union of California	No. 1 State LL&E Unit 9	27-21S-14E	Miocene	4012-20'	Oil	Top salt 4768'
Bel City	Calcasieu	Sohio-General Crude	No. 1 Sweet Lake Ld.	30-10S-6W	Frio	10736-50'	Condensate	
Breton Sound Block 36	Breton Sd. Area	Barnsdall et al	No. 1 State	Block 36	Miocene	4130-200'	Gas	
Caney Creek	Beauregard	Magnolia	No. E-1 Doornbos-McPherson	15-5S-8W	Cockfield	8177-8182'	Oil	
Cote Blanche Island	St. Mary	Texas	No. 12 State Lease 340	Bay-15S-7E	Miocene	13312-48'	Gas	
E. Bel City	Calcasieu	Sohio	No. 1-C Sweetlake Ld.	34-10S-6W	Frio	10882-908'	Gas	
Edna	Jeff.Davis	Irwin & Hudson	No. 1 Houssiere & Latrielle	6-8S-4W	Frio	8908-36'	Oil	Sidetrack
Eugene Island Block 45	Eugene Island Area	Magnolia	No. 1 State	Block 45	Miocene	11351-58'	Condensate	
Fordoche	Pointe Coupee	Texas	No. 1 Long	27-6S-8E	Frio	8286-90'	Oil	
Grand Isle Block 16	Grand Isle Area	Humble	No. 1 State	Block 16	Miocene	4584-96'	Oil	1st sidetrack. Top salt 4672'.
Grand Isle Block 18	Grand Isle Area	Humble	No. 1 State	Block 18	Miocene	8640-65'	Oil	Discovery - 1st Sidetrack. Top salt 7607'. Original hole.
Hog Bayou	Cameron	Sohio	No. 1 Sweeney	22-15S-6W	Miocene	8250-75'	Gas	
Holly Beach	Cameron	Magnolia	No. 1 Abel West Hrs.	7-15S-10W	Miocene	10820-27'	Condensate	
Hurricane Creek	Beauregard	Magnolia	No. 1 McPherson	26-5S-8W	Cockfield	8414-19'	Oil	
Lake Hatch	Terrebonne	Union of California	No. 1 LL&E	8-18S-16E	Miocene	7896-902'	Oil	
Little Lake	Jefferson	Gulf	No. 1-A Little Lake-LL&E	5-18S-23E	Miocene	9889-94'	Condensate	
Lottie	Pointe Coupee	Texas	No. 1 Lottie L&D	25-6S-8E	L.Frio	8848-62'	Condensate	
Main Pass	Main Pass	California	No. 1 State	Block 69	Miocene	5848-57'	Oil	
Marksville	Avoyelles	Hunt	No. 1 Edwards	78-2N-4E	Wilcox	7926-32'	Oil	
Melville	St. Landry	Sun	No. 1 Swift	23-4S-7E	Wilcox	11240-45'	Condensate	
Mid Tepetate	Acadia	Hawkins	No. 1 Young	19-7S-2W	Frio	8530-36'	Condensate	(name not official)
N. Gordon	Beauregard	Barnsdall et al	No. 2 Edgewood	14-6S-10W	Cockfield	8458-63'	Oil	
Pointe a la Hache	Plaquemines	Richardson	No. 4-E Delacroix Corp.	34-16S-14E	Miocene	10196-207'	Condensate	
Ship Shoal Block 72	Ship Shoal Area	Magnolia	No. 1 State	Block 72	Miocene	7266-76'	Condensate	
South Bancroft	Beauregard	Roeser & Pendleton	No. 1 Columbia Ld.	27-6S-13W	Wilcox	10242-52'	Oil	
Sunshine	Iberville	Sohio	No. B-1 Nelson	14-9S-1E	Frio	10305-15'	Oil	
Vermilion Block 71	Vermilion Area	Superior	No. 1-A State	Block 71	Miocene	9608-18'	Condensate	
W. Bivens	Beauregard	Atlantic	No. 1 Kirby Lbr.	17-5S-12W	Wilcox	9328-34'	Oil	

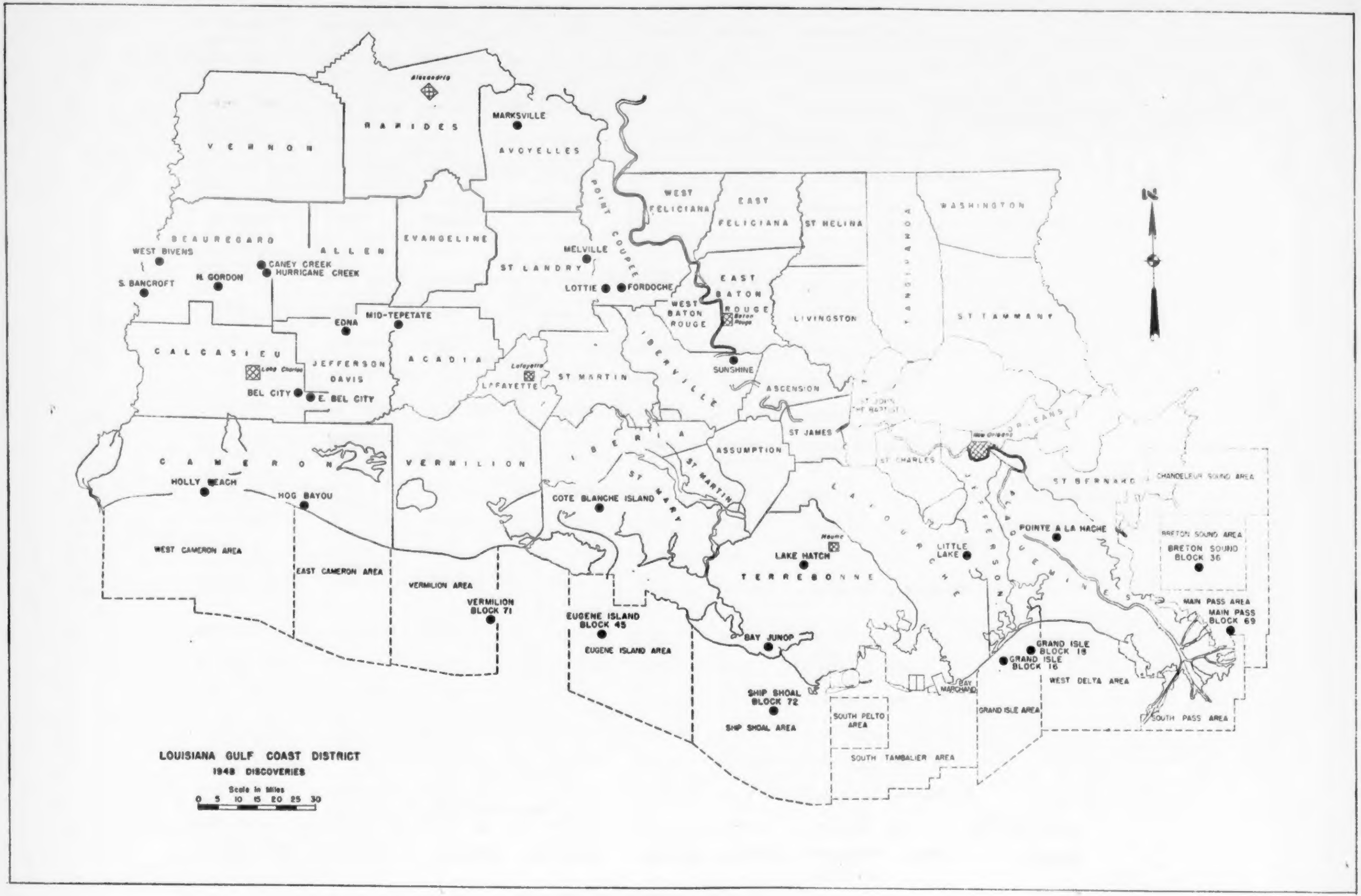
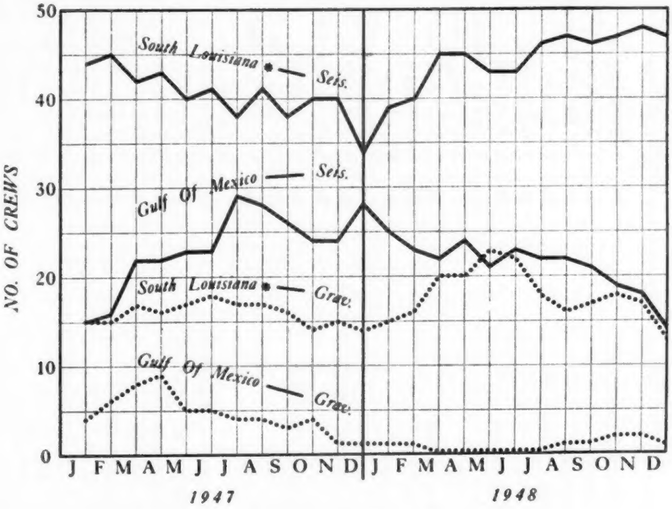

LOUISIANA GULF COAST DISTRICT
1948 DISCOVERIES
Scale in Miles
0 5 10 15 20 25 30
N
VERNON
RAPIDES
Alexandria
MARKSVILLE
AVOYELLES
BEAUREGARD
ALLEN
EVANGELINE
WEST BIVENS
CANEY CREEK
HURRICANE CREEK
S. BANCROFT
N. GORDON
ST LANDRY
MELVILLE
LOTTIE
FORDOCHE
POINT COUPEE
WEST FELICIANA
EAST FELICIANA
ST HELINA
TANGIPAHOA
WASHINGTON
ST TAMMANY
LIVINGSTON
EAST BATON ROUGE
Baton Rouge
WEST BATON ROUGE
IBERVILLE
SUNSHINE
ASCENSION
EDNA
MID-TEPETATE
CALCASIEU
Lake Charles
JEFFERSON DAVIS
ACADIA
Lafayette
LAFAYETTE
ST MARTIN
BEL CITY
E. BEL CITY
CAMERON
VERMILION
IBERIA
ST MARY
ST MARTIN
ASSUMPTION
ST JAMES
ST CHARLES
ORLEANS
New Orleans
ST BERNARD
CHANDELEUR SOUND AREA
HOLLY BEACH
HOG BAYOU
COTE BLANCHE ISLAND
LAFOURCHE
JEFFERSON
PLAQUEMINES
POINTE A LA HACHE
LITTLE LAKE
Houma
LAKE HATCH
TERREBONNE
BRETON SOUND AREA
BRETON SOUND BLOCK 36
MAIN PASS AREA
MAIN PASS BLOCK 69
WEST CAMERON AREA
EAST CAMERON AREA
VERMILION AREA
VERMILION BLOCK 71
EUGENE ISLAND BLOCK 45
EUGENE ISLAND AREA
BAY JUNOP
SHIP SHOAL BLOCK 72
SHIP SHOAL AREA
SOUTH PELTO AREA
SOUTH TAMBALIER AREA
BAY MARCHAND
GRAND ISLE AREA
GRAND ISLE BLOCK 18
GRAND ISLE BLOCK 16
WEST DELTA AREA
SOUTH PASS AREA

FIG. 1

are well distributed throughout the district, with a noticeable concentration in the Eocene trend in Beauregard Parish. Of special significance are the 7 discoveries made in the open waters of the Gulf of Mexico. They represent the results of the very intense geophysical activities in the offshore waters made in 1947 and early 1948 (Fig. 2). These were essentially the higher-grade geophysical prospects, and in 2 cases actually were proved to be shallow piercement-type salt



*This includes only operations within the shoreline.

Fig. 2

domes. The total reserves added by the offshore discoveries are impossible to compute at this time, but must be considered as being very large, because these fields should eventually be as prolific as similar structures on land.

The following descriptions[3] of the new discoveries provide data not given in Table II.

Bay Junop (Terrebonne Parish).—Union Oil Company of California No. 1 State-L.L.&E. Unit 9 completed, August 18, through perforations from 4,012–20′. IP 130 BPD; 9/64″ Ch.; Gr. 37.7°; TP 650; GOR 450. Well encountered 50 feet net oil sand in upper Miocene section. Drilled on a known, but heretofore unproductive salt dome. Subsurface and seismic analyses credited with the discovery. Two dry holes subsequently drilled on structure. 12 miles west of Dog Lake field.

Bel City (Calcasieu Parish).—Sohio and General Crude Oil companies completed No. 1-B Sweet Lake Ld. Co. well as condensate producer on April 9. Perforations in Frio sand at 10,736–50′ and well flowed 31 bbls. condensate and 2,115 MCFGD; through regulator Ch.; Gr. 48°; TP 3,700. 1½ miles east of Holmwood field. One additional condensate producer has been drilled.

[3] ′: Feet. ″: Inches. IP: Initial production. BPD: Barrels per day. Ch.: Choke. Gr.: Gravity. TP: Tubing pressure. GOR: Gas-oil ratio. MCF: 1,000 cubic feet. MCFGD: Thousand cubic feet gas per day. SITP: Shut-in tubing pressure. psi: pounds per square inch. BS&W: Basic sediment and water.

Fig. 1

TABLE III NEW POOL WELLS

FIELD	PARISH	OPERATOR	WELL FARM	TYPE	REMARKS
Bay Baptiste	Terrebonne	Union Producing	No. 1-A Laterre	Cond.	2900' N.W.
Bay St. Elaine	Terrebonne	Texas	No. 1-C State 1246	Cond.	2½ Miles E.
Bayou Blue	Iberville	Crosby	No. 12 Baist Cooperage	Oil	1700' W.
S. Barataria	Jefferson	California Co.	No. 12 Brady	Oil	2600' N.W.
Cankton	St. Landry	Sun	No. 1 Guilbean	Oil	4100' N.
Cankton	St. Landry	Superior	No. 6 Savoie	Cond.	3500' E.
Chacahoula	Lafurche	Sun	No. 1 Lyric Realty	Oil	5500' N.E.
Eagerly	Calcasieu	Gulf	No. E-1 Krause & Managan	Oil	1½ Miles N.W.
Four Isle	Terrebonne	Superior	No. 1 L L & E Unit 19	Oil	2000' S.
Grand Isle Block 18	Grand Isle Area	Humble	No. 1-C State	Oil	2700' S.E.
Garden Island Bay	Plaquemines	Texas	No. 83 State	Oil	
N. Gordon	Beauregard	Barnsdall	No. 3 Edgewood	Oil	2350' E.
Houma	Terrebonne	Union of California	No. 2 Guidry	Cond.	3450' N.E.
Iota	Acadia	Sohio	No. 1-Hayes-Leckelt	Gas	2900' E.
S. Jennings	Jefferson Davis	Union Sulphur	No. 2 Richard	Oil	2000' S.
Leeville	Lafourche	Texas	No. III L L & E	Oil	3800' S.
Leeville	Lafourche	Texas	No. 5 City of New Orleans	Cond.	
W. Mermentau	Jefferson Davis	Boeser & Pendleton	No. 1 Johnson	Cond.	2300' S.W.
E. Moss Lake	Calcasieu	Union of California	No. 1 Powell	Oil	4700' N.W.
E. Mud Lake	Cameron	Magnolia	No. 3-C Lutcher	Oil	3100' S.W.
Oretta	Beauregard	Magnolia	No. 2 Hollis-Mayer	Oil	2600' W.
Pecan Lake	Cameron	Superior	No. B-5 Miami Corp.	Cond.	3500' S.W.
Pecan Island	Vermilion	Humble	No. B-1 Louisiana Fur	Cond.	6745' S.W.
E. Perkins	Calcasieu	Union Sulphur	No. 1 Bauer Unit A	Oil	1500' S.
Plumbob	St. Martin	Texas	No. 21 St. Martin Land	Oil	3150' N.
Potash	Plaquemines	Superior	No. 1 Orleans L. D.	Cond.	2300' N.E.
Port Barre	St. Landry	Burton	No. 2 Methodist Church	Oil	1300' N.
Weeks Island	Iberia	Shell	No. 1 Smith Unit C	Oil	3800' S.E.
Valentine	Lafourche	Texas	No. 1 Guidroz	Cond.	6200' S.E.

Breton Sound Block 36 (Breton Sound area).—Barnsdall made first 1948 offshore discovery with completion of No. 1 State Lease 1,230 well, on March 23. Perforations made from 4,130–42′, and well flowed 2,360 MCFGD through ¼″ Ch.; TP 1,620; dry gas. 12 miles northeast of Grand Bay field.

Caney Creek (Beauregard Parish).—Magnolia completed No. E-1 Doornbos-McPherson well on September 26, through perforations from 8,177–82′ in Cockfield sand. IP 124 BPD; 7/64″ Ch.; Gr. 48.4°; TP 1,000; GOR 897. 3 miles southeast of Hurricane Creek field, also a 1948 discovery.

Cote Blanche Island (St. Mary Parish).—Texas Company No. 12 State Lease 340, 8 miles southwest of West Cote Blanche Bay field, completed April 29 through perforations from 13,300–58′. IP 7,700 MCF dry gas per day through ⅜″ Ch.; SITP 4,800 psi. First production from known shallow piercement type salt dome. Subsurface and seismic analyses led to discovery.

E. Bel City (Calcasieu Parish).—Sohio completed No. 1-C Sweet Lake Ld. Co. well May 20. Field located 2 miles east of newly discovered Bel City field. Perforations from 10,882–908′ in Frio sand, and well produced 1,000 MCF dry gas per day through ⅛″ choke with TP 2,950.

Edna (Jefferson Davis Parish).—Irwin and Hudson No. 1 Houssiere-Latrelle well completed October 16 in side-tracked hole, through perforations from 8,908–36′. IP 66 BPD plus 65% salt water; 9/64″ Ch.; Gr. 39°; TP 900; GOR 1,526. Production established from broken sands in Frio section. One additional producer has been drilled. A subsurface lead was credited with discovery. China field is 5 miles east of well.

Eugene Island Block 45 (Eugene Island area).—Magnolia completed No. 1 State Lease 838 well November 7, through perforations from 11,351–58′. IP 52 bbls. condensate per day; ⅜″ Ch.; Gr. 45.5°; TP 920; GOR 180,000. 14 miles southwest of Rabbit Island field.

Fordoche (Pointe Coupee Parish).—Texas Company No. 1 Long completed December 25 as Frio sand producer through perforations from 8,286–90′. IP 213 BPD; 9/64″ Ch.; Gr. 39.8°; TP 1,900; GOR 1,836. 4 miles west of Lottie field, also a 1948 discovery. One additional oil well has been drilled.

Grand Isle Block 16 (Grand Isle area).—Humble completed No. 1 State Lease 799 in side-tracked hole November 28. Original hole encountered salt at −4,672′. Side-tracked hole perforated from 4,584–96′ and produced 182 BPD; 5/32″ Ch.; Gr. 37.6°; TP 840; GOR 487. Discovery is 10 miles southwest of Queen Bess Island field.

Grand Isle Block 18 (Grand Isle area).—Humble No. 1 State Lease 801 well completed August 15, in side-tracked hole from 8,640–65′, after original hole drilled into salt at −7,607′. IP 806 BPD; ¼″ Ch.; Gr. 30.9°; TP 1,350; GOR 570. Encountered 150′ net oil in well developed upper Miocene sands. Additional producer completed in another directionally drilled hole. Discovery 10½ miles southeast of Queen Bess Island field.

Hog Bayou (Cameron Parish).—On October 17, Sohio completed No. 1 Sweeney as shut-in gas well. Perforations from −8,250–75′ in upper Miocene sand. Grand Cheniere gas field is 10 miles northeast.

Holly Beach (Cameron Parish).—Magnolia No. 1 Abel West Hrs. well, 3 miles northwest of Mud Lake field, completed May 24 from perforations at 10,820–27′. IP 55 bbls. condensate plus 3,361 MCFGD; 12/64″ Ch.; Gr. 53.2°; TP 3,325; GOR 61,455. Production established from isolated sand in very thick Miocene shale section.

Hurricane Creek (Beauregard Parish).—Magnolia made first discovery of 1948 upon completion of No. 1-4C McPherson February 1. Perforations from 8,414–19′ in Cockfield sand. IP 100 BPD; 6/64″ Ch.; Gr. 43.8°; TP 1,150; GOR 700. Nine producers drilled since discovery well. Longville field is 5 miles southwest.

Lake Hatch (Terrebonne Parish).—Union Oil Company of California No. 1 L.L.&E. completed August 19, from perforations at 7,896–902′. IP 235 BPD; 9/64″ Ch.; Gr. 35.1°; TP 1,250; GOR 450. Two subsequent dry holes. Discovery is 8 miles southeast of Gibson field.

Little Lake (Jefferson Parish).—Gulf No. 1-A Little Lake L.L.&E. well completed May 18 from perforations at 9,889–94′. IP 142 bbls. condensate plus 5,570 MCFGD; ¼″Ch.; Gr. 53.4°; TP 3,350; GOR 39,200. One dry hole subsequently drilled. Discovery well 5 miles south of Delta Farms field.

Lottie (Pointe Coupee Parish).—Texas Company No. 1 Lottie Ld. & Dev. Co. well completed February 8 from perforations at 8,848–62′ in thin lower Frio sand. IP 62 bbls. condensate, plus 8,250 MCFGD and 2.7% BS&W; ½″ Ch.; Gr. 53°; TP 1,620; GOR 26,500. Two dry holes since discovery. 3½ miles west of Fordoche, another 1948 discovery.

Main Pass Block 69 (Main Pass area).—California Company No. 1 State Lease 1,278 well completed August 10, through perforations from 5,848–57′ in broken upper Miocene sand section. IP 205 BPD; 5/32″ Ch.; Gr. 26°; TP 260; GOR 250. 7½ miles east of Delta Duck field. One additional producer drilled in 1948.

Marksville (Avoyelles Parish).—Hunt Oil Company completed No. 1 Edwards well August 9 as first Wilcox discovery in 1948. Subsurface and seismic studies led to discovery. Perforations from 7,926–32′. IP 180 bbls. fluid (1% brackish water) per day; ⅛″ Ch.; Gr. 48.1°; TP 1,500; GOR 1,125. One producer and two dry holes since discovery. 12 miles southeast of Big Island field.

Melville (St. Landry Parish).—Sun Oil Company No. 1 Swift well completed November 18, through perforations from 11,240–45′ in sand 400′ below top of Wilcox. IP 190 bbls. condensate per day; 12/64″ Ch.; Gr. 54.8°; TP 3,125; GOR 11,305. 12 miles northwest of Lottie field, another 1948 discovery.

Mid-Tepetate (Acadia Parish).—J. C. Hawkins No. 1 Young well, 1 mile west of Tepetate field, completed as new discovery in Frio section June 27. Perforations from 8,530–36′; IP 92 bbls. condensate per day; ¼″ Ch.; Gr. 60.4°; TP 2,525; GOR 54,300. Discovered by subsurface lead.

North Gordon (Beauregard Parish).—Barnsdall No. 2 Edgewood well completed in Cockfield sand June 16, through perforations from 8,458–63′. IP 146 bbls. condensate; 11/64″ Ch.; Gr. 58.9°; TP 2,575; GOR 10,525. Two additional oil producers since discovery. 2 miles southwest of Longville field.

Pointe a la Hache (Plaquemines Parish).—S. W. Richardson No. 4-E Delacroix Corporation well completed May 13 through perforations from 10,196–207′. IP 85 bbls. condensate plus 4,350 MCFGD; ¼″ Ch.; Gr. 53.4°; TP 3,950. Two gas-condensate wells subsequently drilled. 7½ miles northwest of Potash field.

Ship Shoal Block 72 (Ship Shoal area).—Magnolia completed No. 1 State Lease 766 well August 20. Perforations from 7,266–76′ in favorable upper Miocene sand section. IP 48 bbls. condensate plus 4,800 MCFGD; 14/64″ Ch.; Gr. 47°; TP 2,886. 9½ miles south of Coon Point salt dome.

South Bancroft (Beauregard Parish).—Roeser and Pendleton No. 1 Columbia Ld. & Timber Co. well completed in top of Wilcox November 8, through perforations from 10,242–52′. IP 220 bbls. oil plus 56% salt water per day; ¼″ Ch.; TP 1,325; GOR 3,354. Combination of subsurface and seismic analysis led to discovery. One additional oil well drilled. Bancroft field is 1½ miles north.

Sunshine Field (Iberville Parish).—Sohio-Sinclair completed No. B-1 Nelson well November 23 as Frio discovery, 6 miles southeast of St. Gabriel field. Perforated from 10,305–15′. IP 97 bbls. oil plus 60% salt water per day; 1″ Ch.; TP 25; Gr. 29.1°.

Vermilion Block 71 (Vermilion area).—Superior completed No. 1-A State Lease 884 well July 2. Perforations from 9,608–18′. IP 53 bbls. condensate per day; 20/64″ Ch.; Gr. 51.4°; TP 3,790; GOR 110,-838. Well was abandoned in 1947, but worked over and completed in 1948 as new-field discovery. One additional gas-condensate well drilled. 24 miles southeast of Pecan Island field.

West Bivens (Beauregard Parish).—Atlantic Ref. Co. No. 1 Kirby Lbr. Co. completed November 22 as new Wilcox sand discovery. Perforations from 9,328–34′. IP 195 BPD; ⅛″ Ch.; Gr. 39°; TP 1,050; GOR 311. Bivens field is 4 miles northeast.

The success percentage of the exploration tests drilled in 1948 in the Louisiana Gulf Coast district is a very creditable one, being 21.7 per cent for the entire district, or 18.1 per cent for the inshore tests and 53.8 per cent for the offshore tests. The excellent record of the offshore operations is due to several factors: the operating companies hold leases on most or all of the acreage within the areas of interest, permitting development of the prospect to proceed in the most efficient manner; and the operators have apparently selected and tested only the higher-grade prospects.

GEOPHYSICAL ACTIVITIES

Figure 2 shows the general status of geophysical activities in 1948 as compared with 1947. A break-down between inshore and offshore operations was deemed necessary to show the definite trends of these activities. The chart shows the number of seismograph and gravity-meter crews operating within the district, by months. All during 1947 there was a steady decline in the number of gravity-

TABLE IV
DEEPER-POOL WELLS

New Field	*Parish*	*Operator*	*Well-Farm*	*Type*
Delta Farms	Lafourche	California Company	No. 14 Delta Farms	Oil
Gillis	Calcasieu	Union Sulphur	No. A-1 Mertz	Oil
Golden Meadow	Lafourche	Spartan	No. 4 B & D Unit	Oil
Iowa	Jeff. Davis	Magnolia	No. 1 Scott	Oil
Iowa	Jeff. Davis	Barnsdall	No. 10 Fontenot	Condensate
Lake Mongoulois	St. Martin	Texas	No. 8 State 303	Oil
St. Gabriel	Iberville	Gravais & Mitchell	No. 1 Opdenweyer-Alcas	Oil
W. Barataria	Jefferson	California Company	No. 9 Pailet	Oil

TABLE V
SHALLOWER-POOL WELLS

Field	*Parish*	*Operator*	*Well Farm*	*Type*
David Haas	Avoyelles	Atlantic	No. 11 David Haas	Oil
Pine Prairie	Evangeline	Pan-Am	No. 7-A Schlicher-Thomas	Oil
Raceland	Lafourche	Brown	No. 1-A Dupy	Gas

meter crews operating in the offshore areas. This may be interpreted as the natural slackening of the large-scale activities made in the Gulf during 1946, when these areas were opened for leasing. During 1948, there were practically no offshore gravity-meter operations. It appears that the crews were merely shifted from offshore to inshore operations.

There was a very marked increase in the number of seismograph crews operating in the Gulf in 1947. This is believed to be a natural consequence to the extensive gravity-meter operations in 1946. Most of these seismograph activities probably represent further attempts to delineate anomalies located by gravitational methods. The number of offshore seismograph crews has decreased steadily throughout 1948. Here it appears that the inshore crews were reduced in 1947 to provide for the offshore operations, and during 1948 were gradually shifted back to the inshore areas.

In all, 2,332 seismograph crew-weeks were spent in the inshore areas, which represent an increase of 12.1 per cent over 1947. There were 1,094 seismograph crew-weeks reported from the Gulf of Mexico, which is a reduction of 19.8 per

TABLE #VI
OUTPOST WELLS

FIELD	PARISH	OPERATOR	WELL	FARM	TYPE	REMARKS
Bayou Mallet	Acadia	Union Sulphur	No. A-1	Savoie	Oil	3800' N.E.
Bel City	Calcasieu	Sohio	No. 1-E	Sweet Lk L & O Co.	Cond.	2800' N.E.
Bivens	Beauregard	Atlantic	No. 1-C	Newport Ind.	Oil	1 Mi E.
Bivens	Beauregard	Atlantic	No. B-1	Newport Ind.	Oil	4200' N.E.
N. Cankton	St. Landry	Danciger	No. 1	Gardiner	Cond.	3200' N.
N. Cankton	St. Landry	Gulf	No. 1	Savoie	Oil	1750' W.
David Haas	Avoyelles	Atlantic	No. 1	Stokes	Oil	1100' E.
David Haas	Avoyelles	Atlantic	No. 4	Haas	Oil	1450' S.W.
David Haas	Avoyelles	Atlantic	No. 5	Haas	Oil	1650' S.E.
David Haas	Avoyelles	Atlantic	No. 6	Haas	Oil	1650' N.W.
David Haas	Avoyelles	Atlantic	No. 9	Haas	Oil	1900' S.W.
Egan	Acadia	Atlantic	No. 1	Dommert	Cond.	4000' W.
N. Elton	Allen	Bell Oil	No. 1	Cox	Cond.	2650' W.
Goodhope	St. Charles	Pure	No. 6	G. A. T. X.	Oil	1400' S.W.
Golden Meadow	Lafourche	Texas	No. 34	L.L. & E.	Oil	1 Mi. W.
Houma	Terrebonne	Union of California	No. 1	Theriot	Cond.	4150' S.
Hurricane Creek	Beauregard	Magnolia	No. B-1	McPherson	Oil	2000' S.W.
Hurricane Creek	Beauregard	Magnolia	No. 1-G	Doornbos	Oil	1200' W.
Iota	Acadia	Sohio	No. 1	Burrell	Oil	2150' S.E.
Iota	Acadia	Crown Central	No. 2	Duson	Oil	1100' N.
Lewisburg	Acadia	Callery & Hurt	No. 1	Childs	Cond.	2250' S.W.
Napoleonville	Assumption	Shell	No. 2	Dugas-LeBlanc	Oil	1600' N.
Plumbob Bay	St. Martin	Texas	No. 7	St. Martin School	Oil	2100' N.W.
Pointe a la Hache	Plaquemines	Richardson	No. 5	E. Delacroix	Cond.	1320' N.
Reddell	Evangeline	Continental	No. 8	Pardee	Cond.	3200' N.W.
Reddell	Evangeline	Continental	No. 9	Pardee	Cond.	2200' W.
Savoy	St. Landry	Stanolind	No. 1	L & M Savoie	Cond.	1200' N.
S. Shuteston	St. Landry	Danciger	No. 1	Henry	Cond.	1700' S.W.
S. Shuteston	St. Landry	Stanolind	No. 1	Castille	Cond.	2200' N.E.
Section 28	St. Martin	Stanolind	No. 1	Maraist	Oil	1 Mi. S.W.
N. Tepetate	Acadia	Humble	No. 1	Marton	Cond.	1 Mi. S.W.
W. Tepetate	Jefferson Davis	Burton	No. 1	Keith	Oil	3700' S.W.
Tigre Lagoon	Vermilion	Union of California	No. 1	Thibodeaux	Cond.	4800' W.
Tigre Lagoon	Vermilion	Union of California	No. 1	Dugas	Cond.	2900' S.
Tigre Lagoon	Vermilion	Union of California	No. 1	LeBlanc	Cond.	7000' N.W.
Venice	Plaquemines	Tidewater	No. 1	Rectangle Ranch	Oil	1000' S.
Vinton	Calcasieu	Cox & Hamon	No. 2	Jardell	Oil	2000' N.E.

cent from 1947. There were 900 gravity crew-weeks in the inshore area, an increase of 19.5 per cent over 1947, and only 41 gravity crew-weeks in the Gulf in 1948 as compared with 251 in 1947, a reduction of 83.5 per cent.

LEASING

Leasing has continued at a relatively high level, probably exceeding last year's estimated 3,000,000 acres. A considerable portion of this acreage was leased from the State of Louisiana, mostly in the offshore areas. These areas are shown in Figure 1. They extend to about 30 miles south of the Cameron Parish shoreline, to about 3 miles south of the mouth of the Mississippi River, and to about 30 miles east of the St. Bernard Parish shoreline.

Considerable leasing occurred in the parishes east of the Mississippi River, in the northeastern part of the district.

GENERAL

There was approximately 6,785,000 total footage drilled in the 803 wells in 1948, for an average depth of 8,440 feet per well. The average footage drilled for each producer, explorational and developmental, was 13,800 feet.

The total production in the district in 1948 was 143,258,182 barrels of oil. This represents an increase of 13,834,802 barrels, or 10.7 per cent, over 1947. The total cumulative production in the district since the first discovery in 1897 is 1,421,371,692 barrels. This production came from 214 active and 12 dormant fields.

BULLETIN OF THE AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS
VOL. 33, NO. 6 (JUNE, 1949), PP. 990-1001, 1 FIG., 10 TABLES

DEVELOPMENTS IN ARKANSAS AND NORTH LOUISIANA IN 1948[1]

JOHN R. WILLIAMS[2]
Shreveport, Louisiana

ABSTRACT

Wells drilled during 1948 in Arkansas and North Louisiana totaled 1,811. In 1947, 1,343 wells were drilled. This is a 35 per cent increase in drilling activity. The 1947 total was 34 per cent greater than in 1946.

There were 220 wildcats drilled in 1948; of this total, 106 were drilled in Arkansas and 114 in North Louisiana. In 1947, 237 were drilled; of this number, 76 were in Arkansas and 161 in North Louisiana. The decrease in wildcatting in 1948 was 7½ per cent. For the past several years the percentage increase in wildcatting and total wells drilled have been approximately the same. Much of the increase in total wells drilled in 1948 was due to heavy drilling in old shallow fields such as the Caddo field in Caddo Parish, Louisiana, which increased from 306 producing wells drilled in 1947 to 718 wells in 1948.

In Arkansas 4 new oil fields were discovered. No new gas or distillate fields were found. In addition 7 new oil zones in old fields were added. No new gas or distillate producing zones were discovered.

In North Louisiana 3 new oil fields, 1 new distillate field, and 4 new gas fields were discovered. Three new oil zones, 9 new distillate zones, and 2 new gas zones were added to existing fields. New fields and new producing zones in old fields totaled 33 for the area in 1948. There were 35 in 1947.

Geophysical activity in Arkansas totaled 774 crew weeks, of which the seismograph contributed 426 weeks, the gravity meter 109 weeks, the magnetometer 112 weeks, and the core drill 127 weeks. In North Louisiana crew weeks totaled 1,236, of which 953 were contributed by the seismograph, 216 by the gravity meter, and 67 by the core drill. There were no magnetometer crews reported in North Louisiana. In the area total crew weeks of geophysical activity were 1,986 in 1947; this is comparable with 2,010 in 1948.

INTRODUCTION

The area covered by this paper includes the state of Arkansas and the northern 25 parishes in North Louisiana. In Louisiana the area is bounded on the south by the south lines of Sabine, Grant, and Concordia parishes.

DEVELOPMENT

There was a 35 per cent increase in the number of wells drilled in both states in 1948 relative to the previous year. The 1947 total of 1,343 wells was increased by 468 to 1,811 wells. In Arkansas there was a slight decrease in wells drilled in 1948, from 343 in 1947 to 311 in 1948. In North Louisiana the number of wells increased from 1,000 to 1,500.

In 1948 there were 106 wildcat wells drilled in Arkansas and 114 in North Louisiana, making a total of 220. In 1947, 76 wildcats were drilled in Arkansas and 161 in North Louisiana, making a total of 237. This is a 7½ per cent decrease in wildcatting. For the first time in recent years the number of wildcats drilled in Arkansas closely approached the total in North Louisiana.

The number of producing wells drilled in Arkansas decreased from 199 in 1947 to 144 in 1948. In North Louisiana there was a net increase in producers from 705 in 1947 to 1,173 in 1948.

[1] Manuscript received, March 30, 1949.

[2] The Texas Company.

Total footage of all wells in Arkansas declined 231,000 feet in 1948 as compared with the previous year. In North Louisiana footage increased by slightly over 1,000,000 feet. The great increase in North Louisiana is largely due to a greatly accelerated drilling program in old stripper fields. In the Caddo field, Caddo Parish, Louisiana, for example, the total number of producers drilled increased from 306 wells in 1947 to 718 in 1948. Most of these were completed in the shallow Annona Chalk horizon.

Table II classifies the new-field discoveries and new producing zones added to

TABLE I
NUMBER OF WELLS AND TOTAL FEET DRILLED IN 1948

	Arkansas		*North Louisiana*		*Total*	
	Number	*Feet*	*Number*	*Feet*	*Number*	*Feet*
Oil wells	136	567,732	1,019	2,078,681	1,155	2,646,413
Gas and distillate wells	8	43,631	154	738,026	162	781,657
Dry holes—fields	61	253,879	213	637,651	274	891,530
Dry holes—wildcats	106	407,674	114	559,480	220	967,154
Total	311	1,272,916	1,500	4,013,838	1,811	5,286,754

TABLE II
CLASSIFICATION OF 1948 DISCOVERIES IN ARKANSAS AND NORTH LOUISIANA

	New Oil Field	*New Gas Field*	*New Distillate Field*	*New Oil-Producing Zone in Old Field*	*New Gas-Producing Zone in Old Field*	*New Distillate-Producing Zone Old Field*	*Total*
Arkansas	4	0	0	7	0	0	11
North Louisiana	3	4	1	3	2	9	22
Total	7	4	1	10	2	9	33

existing fields for 1948. In Arkansas 4 new fields were discovered and 7 new producing zones were found in previously established fields. In North Louisiana 8 new fields were discovered and 14 new producing zones were added to old fields. New fields and new producing zones totaled 11 in Arkansas and 22 in North Louisiana for the year. In 1947 there were 18 new discoveries in Arkansas and 17 in North Louisiana. In both states 12 new fields were discovered in 1948; this is comparable with 16 the previous year.

Table III lists the gross oil production for 1948 and the 2 previous years. Production in 1948 in Arkansas and North Louisiana was 10,393,940 barrels greater than in 1947.

The daily average production on January 1, 1948, was 87,500 barrels daily in

TABLE III

BARRELS OF OIL PRODUCED

State	*1946*	*1947*	*1948*
Arkansas	28,364,872	29,770,000	31,622,345
North Louisiana	33,277,270	39,437,010	47,978,605
Total	61,642,142	69,207,010	79,600,950

TABLE IV

PRODUCING WELLS COMPLETED IN ARKANSAS IN 1948

County	*Oil Wells*	*Feet Drilled*	*Gas and Distillate Wells*	*Feet Drilled*	*Total Producing Wells*	*Total Footage—Producing Wells*
Calhoun	6	14,671			6	14,671
Columbia	36	205,292	4	29,601	40	234,893
Franklin			2	6,580	2	6,580
Lafayette	8	46,478			8	46,478
Miller	14	60,829			14	60,829
Nevada	4	8,554			4	8,554
Ouachita	32	92,827	1	1,504	33	94,329
Union	36	139,081	3	29,601	39	151,609
Total	136	567,732	10	50,211	146	617,943

TABLE V

PRODUCING WELLS COMPLETED IN NORTH LOUISIANA IN 1948

Parish	*Oil Wells*	*Feet Drilled*	*Gas and Distillate Wells*	*Feet Drilled*	*Total Producing Wells*	*Total Footage—Producing Wells*
Bienville	1	6,850	7	65,868	8	72,718
Bossier	35	42,819	3	7,121	38	49,940
Caddo	705	1,118,493	13	46,728	718	1,165,221
Catahoula	2	16,442			2	16,442
Claiborne	34	219,138	15	124,648	49	343,786
Concordia	10	64,877	4	36,105	14	100,982
De Soto	4	10,538	12	70,141	16	80,679
Franklin	15	54,785			15	54,785
Grant	10	15,143			10	15,143
La Salle	40	86,510			40	86,510
Lincoln			16	139,674	16	139,674
Madison	2	6,719	1	6,305	3	13,024
Morehouse			14	30,988	14	30,988
Natchitoches	6	23,257			6	23,257
Ouachita			4	23,675	4	23,675
Red River	5	12,741			5	12,741
Richland	12	38,274			12	38,274
Sabine	4	8,497			4	8,497
Tensas	9	70,305	3	15,954	12	86,259
Webster	5	21,654	6	43,511	11	65,165
Union	120	261,639	56	127,308	176	388,947
Total	1,019	2,078,681	154	738,026	1,173	2,816,707

Arkansas and 120,200 barrels in North Louisiana. At the end of 1948 Arkansas was producing 88,000 barrels daily and North Louisiana 138,000 barrels.

Tables IV–VII classify all wells drilled in Arkansas and North Louisiana by counties and parishes and list the footage drilled.

TABLE VI
DRY HOLES DRILLED IN FIELDS, 1948

County or Parish	*No.*	*Feet Drilled*	*County or Parish*	*No.*	*Feet Drilled*
		ARKANSAS			
Ashley	1	6,060	Nevada	1	1,682
Calhoun	2	4,872	Ouachita	24	72,714
Columbia	10	68,256	Sebastian	1	6,350
Franklin	2	8,384	Union	13	57,145
Miller	8	31,885			
			Total	62	257,348
		NORTH LOUISIANA			
Bienville	1	6,800	Lincoln	3	26,732
Bossier	17	22,907	Madison	7	27,505
Caddo	45	91,064	Natchitoches	4	23,460
Catahoula	1	6,007	Red River	5	11,065
Concordia	1	9,152	Richland	12	41,560
Claiborne	8	42,121	Sabine	9	24,194
De Soto	21	49,967	Tensas	2	11,238
East Carroll	1	2,401	Union	39	93,771
Franklin	11	44,961	Webster	7	40,031
Grant	3	5,457	Winn	1	8,592
La Salle	15	48,666			
			Total	213	637,651

The most active fields in Arkansas were the Wesson field, Ouachita County, with 30 producing wells drilled and 21 dry holes, the Smackover field, Union and Ouachita counties, with 19 producers, and the Village field, Columbia County, with 18 producers.

In North Louisiana 718 producers were completed in the Caddo field, Caddo Parish. In the Ora field, Union Parish, 98 oil producers were added during the year. In the Monroe gas field, Union, Morehouse, and Ouachita parishes, 73 gas wells were completed. In the Urania field, La Salle Parish, 28 oil wells were completed. The Lisbon field, Claiborne Parish, added 31 producers and in the Delhi field, Franklin, Madison, and Richland parishes, 29 producing wells were completed. In the Bellevue field, Bossier Parish, 26 wells added. In the Lake St. John field there were 24 new producing wells.

NEW DISCOVERIES

New oil fields.—Four new oil fields were discovered in Arkansas during 1948. They were Felsenthal in Ashley County, College Hill in Columbia County, Cairo and Bear Creek in Union County. The Felsenthal field produces 23°

TABLE VII

WILDCAT DRY HOLES, 1948

County or Parish	*No.*	*Feet Drilled*	*County or Parish*	*No.*	*Feet Drilled*
		ARKANSAS			
Ashley	1	4,756	Lafayette	7	44,840
Benton	1	2,236	Lee	1	3,642
Calhoun	1	2,790	Little River	5	14,720
Chicot	1	3,360	Logan	1	4,777
Clark	5	11,433	Madison	2	1,741
Cleveland	2	8,439	Miller	4	22,704
Columbia	7	46,737	Nevada	9	30,897
Craighead	1	1,510	Ouachita	20	62,173
Crawford	1	1,865	Phillips	2	9,515
Crittenden	1	3,503	Pope	1	2,095
Cross	1	3,508	St. Francis	3	8,186
Dallas	1	2,443	Saline	1	660
Desha	1	4,713	Sevier	2	1,962
Drew	1	6,002	Union	13	66,726
Grant	3	7,315	Woodruff	1	1,600
Hempstead	5	17,610			
Jefferson	1	3,216	Total	106	407,674
		NORTH LOUISIANA			
Bienville	4	32,005	Madison	4	17,965
Bossier	8	29,200	Natchitoches	4	26,116
Caddo	2	11,365	Ouachita	1	4,926
Catahoula	4	31,124	Red River	4	11,369
Claiborne	7	49,551	Richland	4	14,848
Concordia	2	19,771	Sabine	6	32,757
De Soto	9	53,095	Tensas	4	28,344
Franklin	5	23,866	Union	30	86,745
Grant	3	15,233	Webster	2	24,375
Jackson	1	7,858	Winn	8	24,416
La Salle	1	4,010			
Lincoln	1	10,541	Total	114	559,480

gravity oil from a thin sand in the Cotton Valley. This is the first field in Ashley County and is the easternmost field in Arkansas. One well was completed by the end of the year. The College Hill field produces 34.6° gravity oil from the Smackover limestone. Only the initial well was completed in 1948. The Cairo field is productive of 39° gravity oil from the Smackover limestone. During the year 8 producing wells were drilled. The Bear Creek field produces 29.4° gravity oil from the Smackover. Five oil wells were completed in 1948. Cairo and Bear Creek appear to be the most promising of the new oil discoveries.

Three new oil fields were discovered in North Louisiana in 1948. The Saline Lake field in Catahoula and La Salle parishes produces 45° gravity oil from the Wilcox. Five oil wells were completed during the year. The Gorum field in Natchitoches Parish is productive of 45° gravity oil from the Wilcox. One well was completed in 1948. The Truxno field produces 35.6° gravity oil from the Nacatoch at the shallow depth of 2,200 feet. During the year 21 wells were completed.

New gas fields.—There were no new gas discoveries in Arkansas. In North Louisiana 4 were discovered. These were Castor in Bienville Parish, Butler in De Soto Parish, Bosco in Ouachita Parish, and Downsville in Union Parish. Each field had only one completion in 1948. The Castor field produces from a sandstone

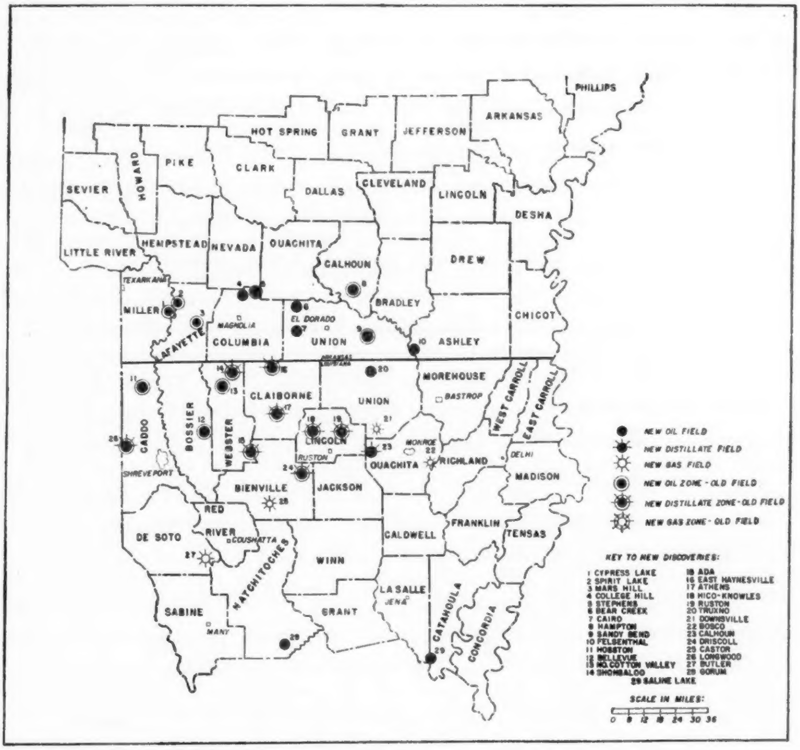


FIG. 1

in the Hosston. The Butler field produces from the Rodessa, Bosco from the Sligo, and Downsville from the Hosston. The importance of these fields can not be determined at this early stage of development.

New distillate fields.—There were no new distillate discoveries in Arkansas in 1948. One was discovered in North Louisiana. This was the Calhoun field in Ouachita Parish. Production is from a sandstone in the Cotton Valley. Only the discovery well was completed by the end of the year.

New oil-producing zones in old fields.—Seven new zones were opened in Arkansas. The Nacatoch was added in the Hampton field in Calhoun County, the Sligo in the Stephens field, Columbia County, the Buckrange and the Hill

TABLE VIII

NEW DISCOVERIES FOR ARKANSAS AND NORTH LOUISIANA DURING 1948

Operator	Farm	County or Parish	Location Sec-Twp-Rng	Depth Producing Zone	Producing Formation	Initial Production	Date Completed	Reason for Drilling	Remarks	Field Name	No. Wells Prod. 1-1-49
ARKANSAS											
Superior Oil Co.	Bradley Lbr. Co. 1	Ashley	11-19S-10W	5874	Cotton Valley	53 bbl oil	11-10-48	Subsurface Seismograph	Discovery	Felsenthal	1
Morris & Lloyd	Freeman-Smith B-3	Calhoun	2-15S-14W	2300	Nacatoch	34 bbl oil	11-4-48	Pool well	New Prod. Formation	Hampton	1
Ohio Oil Co.	H.D. Brown Acct. 3-G	Columbia	13-15S-20W	3274	Sligo	28 bbl oil	6-30-48	Pool well	New Prod. Formation	Stephens	1
McAlester Fuel Co.	W.D. Black A-1	Columbia	24-15S-21W	6532	Smackover	66 bbl oil 9 bbl SW	7-24-48	Subsurface Seismograph	Discovery	College Hill	1
Carter Oil Co.	C.B. Moore 4	Lafayette	13-16S-25W	2650	Buckrange	40 bbl oil 28 bbl SW	4-8-48	Pool well	New Prod. Formation	Spirit Lake	1
McAlester Fuel Co.	Cap Lee A-1	Lafayette	24-17S-24W	7659	Cotton Valley	46 bbl oil	10-21-48	Pool well.	New Prod. Formation	Mars Hill	1
Joe Mucher	C.B. Moore 1	Lafayette	14-16S-25W	4120	Hill Zone (Rodessa)	240 bbl oil	10-14-48	Pool well	New Prod. Sand	Spirit Lake	1
Amerada Pet. Co.	Johnson-Person	Miller	29-16S-25W	3906	Paluxy	185 bbl oil	3-14-48	Pool well	New Prod. Sand	Cypress Lake	1
Southern Prod. Co.	Union Saw Mill 1	Union	12-18S-13W	2257	Nacatoch	8 bbl oil	9-6-48	Pool well	New Prod. Formation	Sandy Bend	2
Phillips Petr. Co.	W.B. Scales 1	Union	3-18S-17W	7760	Smackover	432 bbl oil	7-20-48	Seismograph	Discovery	Cairo	8
G.H. Vaughn	Annie Smith 1	Union	8-16S-17W	6337	Smackover	72 bbl oil	2-26-48	Seismograph	Discovery	Bear Creek	5
NORTH LOUISIANA											
Barnsdall Oil Co.	Davis Lbr. 1	Bienville	7-16N-4W	6760	Sligo	108 bbl dist 10,800 MCFG	8-13-48	Pool well	New Prod. Formation	Driscoll	1
Carter Oil Co.	R.E.Woodward 1	Bienville	26-18N-8W	6730	Sligo	54 bbl dist 5,400 MCFG	6-14-48	Pool well	New Prod. Formation	Ada	3
Placid Oil Co.	Bienville Lbr. Co. 1	Bienville	9-14N-7W	7414	Hosston	15 bbl dist 4.5 MMCFG	12-31-48	Seismograph	Discovery	Castor	1
Sam Siegel	Lodwick Lbr. Co. 2	Bossier	26-19N-11W	1629	Tokio	292 bbl oil	11-23-48	Pool well	New Prod. Formation	Bellevue	2
Ace Oil Co.	Williams 2	Caddo	33-22N-15W	2155	Tokio	300 MCFG	10-7-48	Pool well	New Prod. Formation	Hosston	1
H.J. Strief	Central Trading 2	Caddo	34-22N-15W	2340 2529	Mooringsport	25 bbl oil	6-7-48	Pool well	New Prod. Formation	Hosston	2
Phillips Petr. Co.	Hammack 1	Caddo	6-18N-16W	8162	"D" Sand Cotton Valley	159 bbl dist	12-24-48	Pool well	New Prod. Formation	Longwood	1
Hunt-Gulf	La. Delta Lbr. 1	Catahoula	6-4N-5E	5506	Wilcox	437 bbl oil	6-5-48	Subsurface Seismograph	Discovery	Saline Lake	5
H.L. Hunt	A.O. Goodwin 1	Claiborne	21-23N-7W	10,160	Smackover	360 bbl dist	12-13-48	Pool well	New Prod. Formation	East Haynesville	1
M.A. Halsey et al	Bishop-Lewis 1	Claiborne	30-20N-6W	7210	Hosston	273 bbl dist	11-26-48	Pool well	New Prod. Formation	Athens	1
M.A. Halsey et al	Bishop-Lewis 1	Claiborne	30-20N-6W	8500	Cotton Valley	254 bbl dist	11-26-48	Pool well	New Prod. Formation	Athens	1
The Texas Co.	Rambin 1	De Soto	23-11N-11W	4972	Rodessa	500 MCFG	5-4-48	Subsurface	Discovery	Butler	1
Ark.-La. Gas Co.	J.E. Mitchell 1	Lincoln	20-19N-2W	4750	James Ls.	72,000 MCFG	5-6-58	Pool Well	New Prod. Formation	Ruston	1
Crescent Drlg Co.	C.M.Mathews 1	Lincoln	29-19N-2W	8796	"D" Sand Cotton Valley	56 bbl dist	10-9-48	Pool well	New Prod. Formation	Ruston	1
California Co.	T.L. McCrary 1	Lincoln	14-19N-4W	8912	Cotton Valley	185 bbl dist	10-11-48	Pool well.	New Prod. Sand	Hico-Knowles	1
V.P. Grage et al	W.D. Ambrose 1	Natchitoches	10-5N-6W	5788	Wilcox	91 bbl oil	7-24-48	Seismograph	Discovery	Gorum	1
California Co.	Breece Lbr. Co. 2	Ouachita	30-17N-5E	5232	Sligo	2,250 MCFG	9-28-48	Seismograph	Discovery	Bosco	1
California Co.	Maxey 2	Ouachita	32-18N-1E	9580	Cotton Valley	22 bbl dist 814 MCFG	10-21-48	Subsurface Seismograph	Discovery	Calhoun	1
Newton Oil Co.	D. G. Nale 1	Union	30-23N-1E	2208	Nacatoch	97 bbl oil 146 bbl SW	7-3-48	Trend	Discovery	Truxno	21
Pan-American Prod. Co.	J.H.Albritton 1	Union	10-19N-1E	7378	Hosston	24,000 MCFG	6-6-48	Seismograph	Discovery	Downsville	1
E. V. Whitwell	C.B.Wise 1	Webster	24-22N-10W	2694	Tokio	40 bbl oil	10-10-48	Subsurface	New Prod. Sand	North Cotton Valley	1
Stanolind-Continental	Viola Mitchell 1	Webster	31-23N-9W	10,308	Cotton Valley	312 bbl dist	12-8-48	Subsurface	New Prod. Formation	Shongaloo	1

(Rodessa) in the Spirit Lake field, Lafayette County. In the Mars Hill field the discovery well was plugged back from the Smackover and completed in a Cotton Valley sandstone. A new Paluxy sand was discovered in the Cypress Lake field, Miller County, and in the Sandy Bend field, Union County, the Nacatoch was a new producing zone. None of these new oil zones appears to be of major importance.

In North Louisiana 3 new oil-producing zones were discovered in existing fields. In the Bellevue field, Bossier Parish, a Tokio sand in an untested fault block produced some relatively large initial flows from a depth of approximately 1,600 feet. In the Hosston field, Caddo Parish, limestone porosity in the Mooringsport (upper Glen Rose) was productive in two wells drilled in 1948. In the North Cotton Valley field minor production was secured from one well in the Tokio.

New gas-producing zones in old fields.—No new gas-producing zones were discovered in Arkansas. In North Louisiana there were two. In the Hosston field, Caddo Parish, the Tokio was added. In the Ruston field gas was discovered in the James.

New distillate producing zones in old fields.—No new distillate producing zones were discovered in Arkansas. In North Louisiana 9 were added. In the Ada field, Bienville Parish, the first Pettit producing zone was discovered in June. Previously this field produced only from the Rodessa. In October a well on the south flank produced the first Pettit oil. In the Driscoll field, Bienville Parish, Pettit distillate was added to previous production from the Rodessa, James, and Hosston. One of the more significant discoveries was the discovery of rich gas-distillate in the Longwood field, Caddo Parish, in the "D" sandstone of the Cotton Valley formation. The deepest previous producing zone in this field was the upper Hosston. In the Athens field, Claiborne Parish, new deep distillate zones were discovered in both the Hosston and the Cotton Valley. This appears to be of considerable importance. The first Smackover production in the East Haynesville field was brought in during December. This was the third field in the state to produce from the Smackover. In the Ruston field, Lincoln Parish, the first deep producing zone was discovered in the Cotton Valley. In the Hico-Knowles field, Lincoln Parish, a stray Cotton Valley sand was found productive. Two other Cotton Valley sands, the Bodcaw and the Vaughn, previously produced distillate from the Cotton Valley. In the Shongaloo field, Webster Parish, a series of sands below 10,300 feet registered a large gas-distillate flow from a new producing zone 300 feet above the Smackover. All of the new distillate discoveries in North Louisiana will probably add materially to field reserves.

IMPORTANT NEW FIELDS

Cairo field (Union County, Arkansas).—This field is 9 miles west of El Dorado and 3 miles south of Cairo in west-central Union County, Arkansas. The location for the discovery well was based on seismic work. The discovery well was the Phillips Petroleum Company's (C. A. Kinard) W. B. Scales No. 1, T. 18 S., R. 17

W. Drilling began on May 5, 1948, and was completed, July 20, 1948, at 7,878 feet. Casing perforations between 7,760 and 7,768 feet in the Smackover limestone yielded a flow of 432 barrels of 39.3° gravity oil through a 15/64-inch tubing choke. Tubing pressure was 1,020 pounds. The casing was sealed. The gas-oil ratio was 600:1. Rapid development followed as a number of the leases in the area were nearing the end of their primary term. By the end of the year 8 producing wells had been completed.

Structurally the field is an anticlinal fold slightly elongate northeast and southwest. The discovery well was only 2 miles northeast of production in the Schuler field, an anticline elongate northwest and southeast. The field has subsequently been extended to within 1 mile of the Schuler field. Two other small fields (Wilks and East Schuler) are on structures very close to Schuler.

Prior to drilling, the seismic anomaly was not considered a first-class prospect due to its small size. The section of saturated Smackover limestone has a maximum thickness of more than 75 feet. Two separate water levels are present in the field. This is probably due to discontinuous zones of porosity. Spacing has been established at one well to 40 acres.

Truxno field (Union Parish, Louisiana).—This field is in north-central Union Parish, 12 miles north of Farmerville, the parish seat of Union Parish. It was discovered by trend drilling subsequent to the discovery of the Ora field. The discovery well was the Newton Oil Corporation's D. G. Nale No. 1, Sec. 30, T. 23 N., R. 1 E. This well was drilled to 2,215 feet and completed on July 3, 1948, from casing perforations between 2,208 and 2,214 feet. Initial flowing production was 97 barrels of 35.6° gravity oil and 146 barrels of salt water through a ¼-inch tubing choke. Casing pressure was 200 pounds and tubing pressure 130 pounds. Production is from the Nacatoch sandstone. During the year 21 oil wells were completed. Spacing is 1 well to 10 acres.

This field is 4 miles northeast of, and in trend with, the axis of the Ora field. Truxno is a very narrow northeast-southwest-trending low-relief fold. The effective producing sand is very thin and production is closely related to effective sand distribution as at Ora.

Numerous dry holes have been drilled in an attempt to extend the field. The old Oakland field (Secs. 7 and 18, T. 23 N., R. 1 E.) produced in a small way from a few wells in the Nacatoch in the early 1920's, ½ to 2½ miles north and northeast of Truxno. This field, now abandoned, may eventually be found continuous with Truxno.

IMPORTANT DEVELOPMENTS IN OLD FIELDS

Longwood field (Caddo Parish, Louisiana).—This field is in west-central Caddo Parish. It produces from the Nacatoch, Goodland, Paluxy, Pettit, and from the upper Hosston. The first deep test on this structure was the Phillips Petroleum Company's Hammack No. 1, Sec. 6, T. 18 N., R. 16 W. Drilling began on August 2, 1948, and was completed on December 24, 1948. A depth of 9,428

feet was reached. This was 1,700 feet below the top of the Cotton Valley formation. Perforations in the "D" sandstone of the Cotton Valley from 8,162 to 8,210 feet yielded a flow of 159 barrels of 61° gravity distillate through a $\frac{1}{4}$-inch tubing choke. The gas-oil ratio was 13,383:1. The sand body is 35 feet thick. This discovery will without doubt add very materially to the reserves of the field. The Longwood field is 25 miles west of the Benton field, Bossier Parish, which was previously the most westerly area of Cotton Valley production in North Louisiana.

Shongaloo field (Webster Parish, Louisiana).—The first Smackover limestone test in this field was drilled during the year. This was the Stanolind and Continental's Viola Mitchell No. 1, Sec. 31, T. 23 N., R. 9 W. Drilling commenced, May 7, 1948, and completion, after an extensive fishing job, was on December 9, 1948. The upper 78 feet of the Smackover was penetrated. In the Haynesville field, 8 miles northeast of this well, oil is produced from two excellently developed porous zones in the Smackover. The Smackover penetrated in this well, however, was dense. Some years ago minor Cotton Valley production was developed in the Shongaloo field in the Roseberry and Sexton sands between 8,900 and 9,000 feet. In the Mitchell well perforations from 10,308 to 10,320 feet and 10,327 to 10,333 feet yielded a flow of 312 barrels of 57° gravity distillate through a $\frac{1}{4}$-inch tubing choke. The gas-oil ratio was 7,340:1. The producing sands occur in the so-called "Haynesville pinks." The age of this is debatable but is probably pre-Cotton Valley. This producing level is 300 feet above the Smackover.

IMPORTANT DEEP TESTS IN FIELDS

Sailes field (Bienville Parish, Louisiana).—The first well to drill below the upper Hosston was the Union Producing Company's Lester No. 1, Sec. 5, T. 16 N., R. 7 W. At the total depth of 11,129 feet the upper 550 feet of the Cotton Valley was penetrated. No showings were reported in the deeper beds and the well was plugged on July 1, 1948.

Driscoll field (Bienville Parish, Louisiana).—Barnsdall's Davis Lumber Company No. 1, Sec. 7, T. 16 N., R. 4 W., was drilled to 11,330 feet. Approximately 1,200 feet of the Cotton Valley was penetrated. Some slight showings were encountered in the deeper beds but no commercial production could be obtained and the well was plugged back and completed as the first Pettit producer in the field (6,760 feet).

Sligo field (Bossier Parish, Louisiana).—The North American Oil Consolidated's J. Swinney No. 1, Sec. 5, T. 17 N., R. 11 W., was the first Cotton Valley test in this field. The deepest previous well penetrated the upper 650 feet of the Hosston. The Swinney well was drilled 525 feet into the Cotton Valley at a depth of 8,363 feet. No showings were reported and the well was abandoned on September 17, 1948.

Athens field (Claiborne Parish, Louisiana).—The first Cotton Valley test in this field was Halsey's Bishop-Lewis No. 1, Sec. 30, T. 20 N., R. 6 W. At the total

depth of 9,523 feet the upper 1,525 feet of the Cotton Valley was penetrated. Two new deep producing zones were discovered by this well. Distillate was obtained from a lower Hosston sand at 7,210 feet and from the "Vaughn" sand of the Cotton Valley at 8,500 feet. The well was dually completed from these sands on November 26, 1948.

Ruston field (Lincoln Parish, Louisiana).—The first Cotton Valley test in this field was the Crescent's C. M. Mathews No. 1, Sec. 29, T. 19 N., R. 2 W. At the total depth of 9,389 feet the upper 1,100 feet of the Cotton Valley was penetrated. Distillate was produced from the "D" sand of the Cotton Valley from casing perforations between 8,796 and 8,806 feet.

North Shongaloo field (Webster Parish, Louisiana).—H. L. Hunt's R. P. Campbell No. 1, Sec. 14, T. 23 N., R. 10 W., was drilled to 11,700 feet and completed as a dry hole on November 26, 1948. No information was released on this well. It is probable that the Smackover was reached.

TABLE IX

GEOPHYSICAL ACTIVITY, 1948

Month	*Seismograph*	*Gravity Meter*	*Magnetometer*	*Core Drill*	*Total*
			ARKANSAS		
January	35	4	14	8	61
February	32	6	16	8	62
March	32	11	16	12	71
April	44	13	19	15	91
May	30	8	12	12	62
June	28	10	8	11	57
July	32	15	8	10	65
August	28	12	4	11	55
September	40	13	8	9	70
October	36	7	5	8	56
November	40	5	2	8	55
December	49	5	0	15	69
Total	426	109	112	127	774
			NORTH LOUISIANA		
January	56	32	0	0	88
February	62	27	0	0	89
March	74	22	0	1	97
April	92	20	0	5	117
May	77	12	0	4	93
June	80	12	0	4	96
July	103	13	0	9	125
August	76	8	0	8	92
September	90	17	0	10	117
October	81	21	0	8	110
November	68	15	0	8	91
December	94	17	0	10	121
Total	953	216	0	67	1,236

GEOPHYSICAL DATA

The geophysical data for the year are summarized in Table IX. Geophysical activity in Arkansas totaled 774 crew weeks. This is slightly greater than the 1947 total of 705. Gravity-meter work declined considerably in 1948 relative to 1947 and magnetometer activity was doubled in 1948.

There was a slight decline in geophysical activity in North Louisiana from 1,281 crew weeks in 1947 to 1,236 in 1948. There was a considerable increase in seismic activity. Gravity exploration in North Louisiana declined from 510 weeks to 216.

For both states geophysical activity increased slightly, from 1,986 weeks in 1947 to 2,010 in 1948.

EXPLORATORY METHODS RESULTING IN NEW DISCOVERIES

As shown by Table X, subsurface exploration accounted for 3 new discoveries, 3 were a combination of seismograph and subsurface work and 6 were attributed to seismic work. Only 1 discovery was due to random drilling. Twenty were the result of drilling for deeper sands or plugging back to new shallower sands in established fields.

TABLE X

NEW DISCOVERY METHODS

	Sub-surface	*Seismo-graph*	*Subsurface Seismo-graph*	*Pool Well*	*Trend*
Number of new discoveries	3	6	3	20	1

BULLETIN OF THE AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS
VOL. 33, NO. 6(JUNE, 1949), PP. 1002-1010, 1 FIG., 6 TABLES

DEVELOPMENTS IN SOUTHEASTERN STATES IN 1948[1]

R. M. HARRIS[2] AND W. M. PAYNE[2]
Jackson, Mississippi

ABSTRACT

The Southeastern district includes the states of Alabama, Florida, Georgia, and Mississippi.

Wildcatting continued at approximately the same rate as in 1947 while development in established producing areas showed a decline.

Geophysical crew weeks worked decreased during the year to 2,356 from the 1947 figure of 2,588.

Alabama had a total of 20 wildcats drilled and abandoned during 1948.

One producer was added to the Gilbertown field, Choctaw County, Alabama. Production from the field was 480,316 barrels during the year, bringing the total cumulative production to 1,569,876 barrels.

A total of 405 crew weeks of geophysical work was done in the state during the year against 476 weeks in 1947.

Florida had a total of 24 wildcats drilled and abandoned in 1948.

In the Sunniland field, Collier County, Florida, 3 producers and 1 dry hole were completed during the year.

Production for 1948 was 290,000 barrels, bringing the total cumulative to 649,694 barrels.

There were 169 geophysical crew weeks worked in the state during 1948, while 249 weeks were worked in 1947.

Georgia had only 3 wildcats drilled and abandoned in 1948.

Geophysical crew weeks totaled 17 in 1948 and 27 in 1947.

Mississippi had a total of 109 wildcats drilled during 1948 which resulted in the discovery of 5 new fields and 4 salt domes. In the established producing areas in the state, 234 producers and 54 dry holes were added.

All Mississippi fields produced a total of 45,662,115 barrels of oil and condensate during the year, bringing the total cumulative production in the state to 208,072,064 barrels.

There was a decrease in geophysical crew weeks worked from 1,839 in 1947 to 1,765 in 1948.

INTRODUCTION

The Southeastern district includes the states of Alabama, Florida, Georgia, and Mississippi.

Data for each of the four states are listed separately and include the more significant features of drilling, production, and geophysical development.

As in the past 2 years no distinction is made between wildcat wells and stratigraphic tests when these latter penetrated one or more of the present producing formations of the area and were drilled in such a manner as to make it possible to complete as oil or gas wells if the occasion arose.

ALABAMA

Twenty wildcats were drilled and abandoned in Alabama during 1948 which exactly equaled the 1947 figure.

The Cretaceous province of the state continued to attract most attention with 11 wildcats in the southwestern part of Alabama and 5 in the southeastern part. The Paleozoic area of north Alabama accounted for the remaining 4 wells.

Practically all of these wells were drilled on gravity-meter or seismograph anomalies.

[1] Manuscript received, March 12, 1949.

[2] Consulting geologists. The writers wish to express their thanks to the Mississippi Oil Scouts Association for furnishing numerous data used in this paper.

One new well was added to Alabama's only oil field, Gilbertown, in Choctaw County, in 1948. Production for the year was 480,316 barrels from 34 wells bringing total cumulative to 1,569,876 barrels.

Principal producing formation is the Eutaw at approximately 3,300 feet although a few wells are producing from the Selma chalk at approximately 2,700 feet.

Alabama's first piercement salt dome was discovered by the Humble Oil and Refining Company's Washington Lumber and Turpentine Corporation No. 1 core test, Sec. 29, T. 3 N., R. 1 E., Washington County. This hole was completed in June, 1948, at the total depth of 540 feet in salt which was topped at 410 feet. The Alabama Geological Survey has assigned the name McIntosh to this dome after the near-by town of McIntosh, Alabama.

There was a slight decrease in geophysical and core-drill work in the state from the 1947 figure. Gravity-meter work showed the largest decline but core drill and seismograph gained. As in the case of wildcatting the Cretaceous province was favored for geophysical work.

Table I gives a comparison of the types of surveys by crew weeks worked during the past 2 years.

TABLE I

	Core Drill	*Gravity Meter*	*Magnetometer*	*Seismograph*	*Total*
1947	159	180	18	119	476
1948	170	76	0	159	405

FLORIDA

Florida had a total of 24 wildcats drilled and abandoned during 1948 against 25 in 1947.

A breakdown shows that 9 of these wells were drilled in the panhandle or western part of the state, while in the peninsula 7 were in the north part, 5 in the central part, and 3 in the south part.

One of these wells, the Humble Oil and Refining Company's Gulf Coast Realty Company No. 1-C, Sec. 21, T. 47 S., R. 28 E., Collier County, encountered oil showings of sufficient consequence to justify running casing for production test.

With a total depth of 12,120 feet, casing was set at 11,906 feet and hole plugged back to 11,950 feet. Several tests in open hole from 11,906 to 11,950 feet recovered varying amounts of oil and salt water. While considerable oil was recovered on these tests, fill-up rate was very slow and this, together with the high percentage of salt water, resulted in abandonment.

In Florida's Sunniland field, Collier County, 3 producers and 1 dry hole were added during the year.

Production for the field, which is from the Sunniland limestone of probable

Glen Rose age, amounted to 290,000 barrels in 1948 from 8 wells, bringing the total cumulative to 649,694 barrels.

Total geophysical and core-drill weeks worked in the state during 1948 showed a decline of more than 30 per cent from the 1947 figures, due mostly to the decrease of core-drill work.

The air-borne magnetometer made its debut in the district during the late spring of the year and, with 30 weeks of work reported, it is credited with having covered most of the counties of the peninsula.

Most of the core-drill and gravity-meter work was carried on in the western part of the panhandle.

Table II gives a record of crew weeks worked on various methods during 1947 and 1948.

TABLE II

	Core Drill	*Gravity Meter*	*Magne-tometer*	*Seismo-graph*	*Total*
1947	190	14	0	45	246
1948	82	42	30	15	169

GEORGIA

Georgia had 3 wildcats drilled and abandoned in 1948 compared to 5 in 1947. Two of these were in the south-central part of the state and one on the southeast Atlantic coast.

There were no gravity-meter or magnetometer crews reported in Georgia during 1948 but a limited amount of core-drill and seismograph work was done in the extreme southern part during the year.

Table III gives crew weeks worked by each method.

TABLE III

	Core Drill	*Gravity Meter*	*Magne-tometer*	*Seismo-graph*	*Total*
1947	0	0	0	27	27
1948	10	0	0	7	17

MISSISSIPPI

There was a total of 109 wildcats drilled in Mississippi during 1948 which led to the discovery of 5 new fields and 4 shallow piercement salt domes. In 1947, 81 wildcats resulted in the discovery of 3 fields and 5 salt domes.

NEW FIELDS

1. *Ovett.*—The Ovett field is in south-central Jones County, approximately 15 miles south of Laurel, and was discovered by the Gulf Refining Company's L. L. Majors No. 1, Sec. 29, T. 6 N., R. 11 W.

First showings of heavy black oil were noted in a core at 7,294 feet in the basal Eutaw and several other sands showing this type of oil were cored in the upper and lower Tuscaloosa.

Numerous lighter oil showings were also encountered while coring in the Paluxy and Glen Rose sections, and casing was set at 13,157 feet to test some of these after the well had been drilled to the total depth of 13,251 in salt which was first encountered at 13,152 feet.

An over-all interval from 12,011 to 13,082 feet was perforated and on a 4-day test the well flowed an average of 101 barrels of oil a day through $\frac{1}{4}$-inch tubing choke. However, flowing pressure declined steadily and pump was installed and well completed, January 5, 1948, pumping at the rate of 214 barrels of 31.3° A.P.I. gravity oil a day.

During the year 3 other wells were drilled to the Majors' producing section within a radius of $1\frac{1}{4}$ miles of the discovery well. Two of these wells encountered some oil showings which in the Placid Oil Company's A. E. Walters, $\frac{1}{2}$ mile southwest of the Majors, appeared to justify the installation of casing and pumping equipment. Perforated interval from 8,445 to 8,455 feet was tested but the extremely slow rate at which fluid entered the pipe resulted in temporary abandonment.

The Ovett area appears to be rather complicated by faulting and it will doubtless require several additional wells before a clear picture of structural conditions can be obtained, especially as related to the heavy oil accumulation found in the Upper Cretaceous sands.

2. *East Yellow Creek.*—The East Yellow Creek field is in the north part of Wayne County, a little more than 2 miles east of production in the Yellow Creek field.

The discovery well was Walter E. Sistrunk's Ralph Stanley No. 1, Sec. 8, T. 9 N., R. 7 W., completed on August 15, 1948.

The well was drilled and cored to the total depth of 5,507 feet. Saturated oil sands were cored from two of the upper Eutaw producing zones of the Yellow Creek field: the Morrison and City Bank.

Casing was set at 5,037 feet and the well completed through perforations opposite these two zones pumping 180 barrels of 19.6° A.P.I. gravity oil a day.

At the close of the year a north and a south offset to the discovery well had been completed as producers.

Subsurface geology should be credited with the discovery of this field as the Sistrunk location was made after the area had been mapped from data obtained from wells previously drilled.

3. *Sandy Hook field.*—The Sandy Hook field is in the extreme south part of Marion County, approximately 6 miles south of the Hub field and the same distance west of the Baxterville field, and was discovered by the Humble Oil and Refining Company's Earnest R. Ford *et al.* No. 2, Sec. 13, T. 1 N., R. 18 W., which was completed, July 20, 1948.

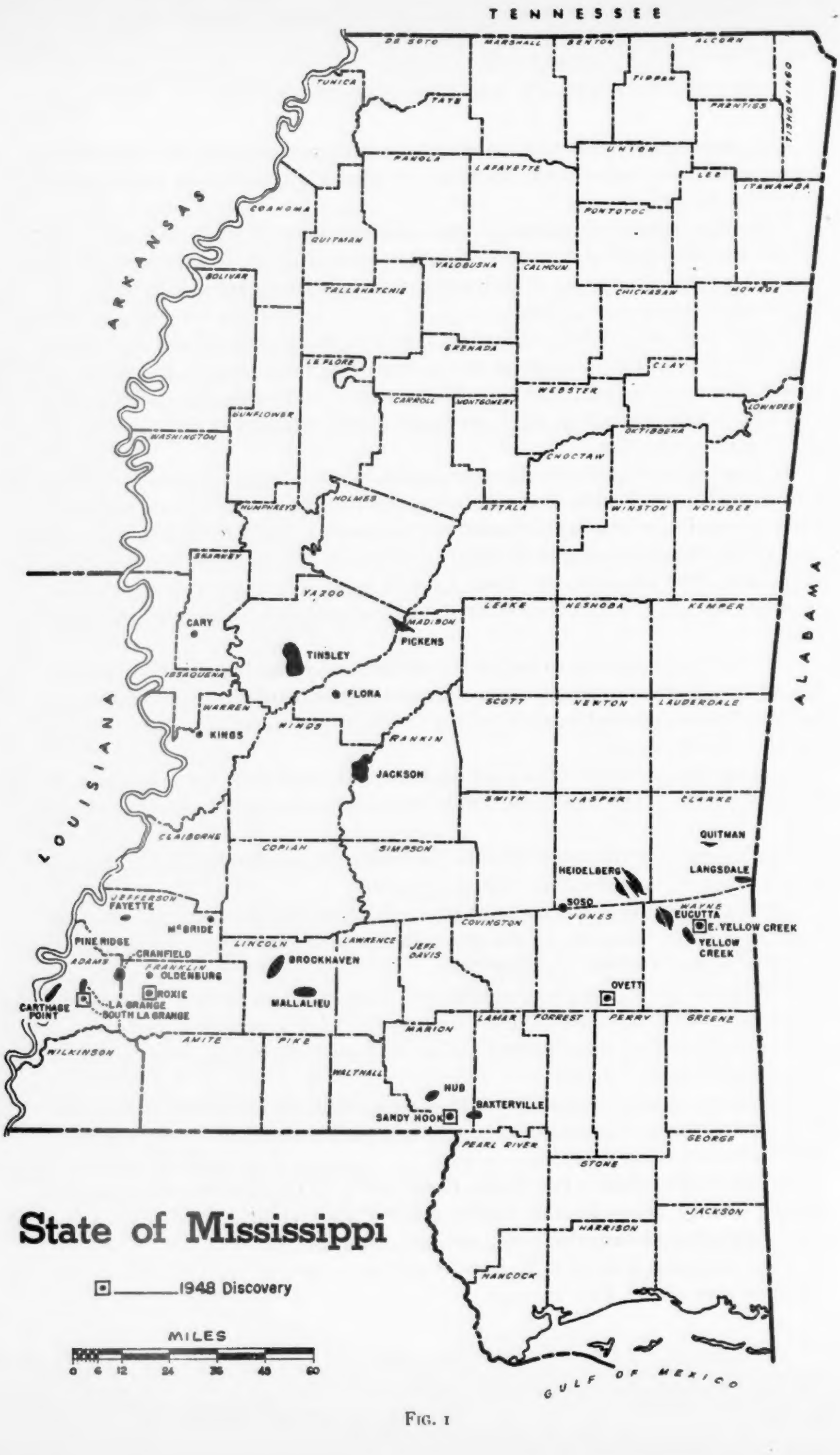

TENNESSEE
ARKANSAS
LOUISIANA
ALABAMA
GULF OF MEXICO
DE SOTO
MARSHALL
BENTON
ALCORN
TUNICA
TIPPAH
TISHOMINGO
TATE
PRENTISS
UNION
PANOLA
LAFAYETTE
LEE
ITAWAMBA
COAHOMA
PONTOTOC
QUITMAN
YALOBUSHA
CALHOUN
BOLIVAR
TALLAHATCHIE
CHICKASAW
MONROE
GRENADA
LE FLORE
CLAY
WEBSTER
CARROLL
MONTGOMERY
LOWNDES
SUNFLOWER
OKTIBBEHA
WASHINGTON
CHOCTAW
HOLMES
HUMPHREYS
ATTALA
WINSTON
NOXUBEE
SHARKEY
YAZOO
LEAKE
NESHOBA
KEMPER
MADISON
CARY
PICKENS
TINSLEY
ISSAQUENA
FLORA
SCOTT
NEWTON
LAUDERDALE
WARREN
HINDS
KINGS
RANKIN
JACKSON
SMITH
JASPER
CLARKE
QUITMAN
CLAIBORNE
COPIAH
SIMPSON
HEIDELBERG
LANGSDALE
JEFFERSON
FAYETTE
SOSO
WAYNE
McBRIDE
COVINGTON
JONES
EUCUTTA
PINE RIDGE
E. YELLOW CREEK
YELLOW CREEK
LINCOLN
LAWRENCE
JEFF DAVIS
CRANFIELD
ADAMS
FRANKLIN
OLDENBURG
BROOKHAVEN
ROXIE
OVETT
CARTHAGE POINT
LA GRANGE
SOUTH LA GRANGE
MALLALIEU
LAMAR
FORREST
PERRY
GREENE
MARION
AMITE
PIKE
WILKINSON
WALTHALL
HUB
BAXTERVILLE
SANDY HOOK
PEARL RIVER
GEORGE
STONE
JACKSON
HARRISON
HANCOCK
State of Mississippi
1948 Discovery
MILES
0 6 12 24 36 48 60

FIG. 1

Previous to the discovery a well drilled 1 mile north had tested some gas and condensate but was abandoned, June 11, 1947.[3]

Additional seismograph work led to the location of the Earnest R. Ford *et al.* No. 2, which was drilled and cored to the total depth of 10,696 feet in the Comanche. Casing was then run to 9,145 feet to test showings of gas encountered while coring in the lower Tuscaloosa. Perforations were made from 8,979 to 8,994 feet and from 8,997 to 9,002 feet and the well was completed, flowing at the rate of 4,420,000 cubic feet of gas a day, plus 53.5 barrels of 53° A.P.I. gravity condensate.

At years end one additional gas-condensate well had been completed in the field and a second was in the late stages of completion as a producer.

4. *South La Grange.*—The South La Grange discovery well, Harry W. Elliott's Edwin B. Ogden No. 1, Sec. 42, T. 6 N., R. 2 W., is $1\frac{1}{2}$ miles south of production in the La Grange field of Adams County.

The Edwin B. Ogden No. 1, was drilled to the total depth of 6,501 feet and electric log made. Several side-wall samples from 6,411 to 6,426 feet in the Wilcox revealed sand containing oil, and casing was set and perforated from 6,410 to 6,418 feet, and the well completed on September 26, 1948, flowing 259 barrels of 44° A.P.I. gravity oil a day through 11/64-inch tubing choke.

At the end of 1948 three producers and three dry holes had been completed in the field and it appeared that any additional development would probably be in northeast and southwest directions.

5. *Roxie.*—The Roxie field is in the southwest part of Franklin County, 22 miles southeast of Natchez and 6 miles south of the Oldenburg field.

The discovery well, H. L. Hunt's W. L. Graves No. 1, Sec. 29, T. 6 N., R. 2 E., was located and drilled following gravity and seismograph work.

With the total depth of 10,990 feet the hole was plugged back to 10,613 feet for an open-hole drill-stem test of a sand in the lower Tuscaloosa. Decision to test this sand was made after a single side-wall core, which was taken after making electric log, was recovered showing oil staining.

Considerable oil and oil-cut mud were recovered on this test and casing was set and the well completed on December 6, 1948, flowing at estimated rate of 3,552,000 cubic feet of gas and 553 barrels of 50° A.P.I. gravity condensate a day through $\frac{1}{2}$-inch choke from perforated interval of 10,578 to 10,585 feet.

OTHER INTERESTING DEVELOPMENTS

While most of the oil and gas production in Mississippi is from sands of Cretaceous age, the Wilcox formation is becoming more important as a source of additional oil reserves for the state.

Commercial Wilcox production was first found in the Cranfield field in the latter part of 1943 but its full significance was clouded by the fact that the

[3] R. M. Harris and W. M. Payne, "Development in Southeastern States in 1946 and 1947," *Bull. Amer. Assoc. Petrol. Geol.*, Vol. 32, No. 6 (June, 1948), p. 1073.

prolific basal Tuscaloosa sand was found in the field at about the same time and it was not until the discovery of the La Grange field in 1946 that the Wilcox ceased to be an adjunct to Tuscaloosa exploration and became the objective for numerous, though widely scattered wildcats.

To date there are only three Wilcox fields in the state but exploratory drilling in this province is still in the embryonic stage and the prospects of finding considerable Wilcox oil reserves in the future are considered very good.

During 1948 four wildcats resulted in the discovery of a like number of salt domes. Three of these are considered worthy of mention because of the oil showings encountered while drilling.

Humble Oil and Refining Company's Zula Daughtry No. 1, Sec. 28, T. 8 N., R. 15 W., Covington County, discovered the Kola salt-dome with top of salt encountered at 3,048 feet. Several shows of asphaltic oil were noted in the cap rock and casing was set at 2,421 feet but tests through perforations from 2,238 to 2,258 feet showed only brackish water with a little dead oil and the well was abandoned, March 20, 1948.

Sun Oil Company's David Gains Estate No. 1, Sec. 1, T. 5 N., R. 6 W., Greene County, discovered the County Line dome when it drilled into salt at 2,169 feet. Numerous showings of oil were found in side-wall cores taken through an over-all section from 1,085 feet to 1,270 feet.

TABLE IV

1948 Mississippi Salt-Dome Discoveries

Name	*County*	*Operator*	*Well*	*Location*	*Total Depth (Feet)*	*Remarks*
Kola	Covington	Humble Oil & Ref. Co.	Daughtry 1	28-8N-15W	3,117	Salt, 3,048 (See text)
County Line	Greene	Sun Oil Co.	Gaines Est. 1	1-5N-6W	2,176	Salt, 2,169 (See text)
McLaurin	Forrest	Danciger Oil & Ref. Co.	Love Petrol. Co.	10-2N-13W	1,950	Cap rock, 1,705 Salt, 1,935
Vicksburg	Warren	California Co.	Johnston 1	15-16N-5E		Salt, 4,386 (See text)

These showings led to the drilling of the second well, Gaines Estate No. 2, 68 feet northwest. Oil showings were found in cores taken between 1,097 feet and 1,120 feet but two drill-stem tests recovered only small amounts of water with sulphur odor and trace of oil, and hole was abandoned, June 3, 1948.

The California Company's Mattie Johnston No. 1, Sec. 15, T. 16 N., R. 3 E., Warren County, discovered the Vicksburg dome, but is probably more interesting because of the oil showings found in the Wilcox before salt was encountered at 4,386 feet.

With the total depth of 4,401 feet, whipstock was set at 2,051 feet and tools side-tracked in an effort to improve on structural position. Wilcox sand showing oil was cored from 4,030 to 4,035 feet but salt water content was very high and the well was abandoned, September 14, 1948.

It is felt that the showings in these wells, and in previous tests drilled on piercement salt domes[4] in Mississippi are worth recording as the time may come when it will be justified, from an economical standpoint, to carry on a systematic drilling campaign on this type of structure in an effort to establish commercial production.

OIL AND GAS PRODUCTION

Accumulated total production from each of the oil and/or condensate fields in Mississippi for 1947 and 1948 is shown in Table V.

During 1947 approximately 40 billion cubic feet of gas was produced from fields in the state while in 1948 this figure was increased to approximately 55 billion cubic feet.

TABLE V

Field	*Discovery Date*	*Accumulated Production (Barrels)*	
		1947	*1948*
Tinsley	9- 5-39	100,979,226	107,030,185
Heidelberg	1-30-44	13,471,705	18,716,917
Cranfield	10- 6-43	12,579,768	18,523,624
Pickens	4- 9-40	9,899,769	11,239,672
Eucutta	10- 7-43	7,420,683	10,094,643
Baxterville	11-18-44	6,293,255	13,871,397
Brookhaven	7- 8-43	5,641,696	10,636,785
Mallalieu	8-24-44	2,434,053	8,532,053
La Grange	2-18-46	986,750	3,859,932
Langsdale	1-18-45	839,907	1,154,351
Gwinville	8-11-44	556,821	863,278
Carthage Point	2-13-43	514,192	1,124,735
Fayette	8-14-45	342,458	529,703
Hub	3- 3-45	254,411	491,338
Flora	9- 8-43	60,051	73,200
Cary	9-16-41	59,324	59,324
Pine Ridge	12- 5-46	43,294	220,337
SoSo	3- 1-45	10,533	159,627
Quitman	10-21-45	2,490	2,490
Yellow Creek	12-21-47	1,565	774,290
So. La Grange	9-26-48	—	36,128
Ovett	1- 5-48	—	34,668
E. Yellow Creek	8-15-48	—	24,290
Oldenburg	10-19-47	—	16,840
Sandy Hook	7-20-48	—	625
Totals		162,409,951	208,072,064

EXPLORATION

Geophysical and core-drill work in Mississippi showed a slight decline from the 1947 figure.

Table VI gives a comparison, by crew weeks worked, of the various methods used in the state.

[4] R. M. Harris and W. M. Payne, "Development in Southeastern States in 1946 and 1947," *Bull. Amer. Assoc. Petrol. Geol.*, Vol. 32, No. 6 (June, 1948), pp. 1070 and 1074.

TABLE VI

	Core Drill	*Gravity Meter*	*Magnetometer*	*Seismograph*	*Total*
1947	250	360	73	1,156	1,839
1948	221	297	71	1,176	1,765

CONCLUSION

Wildcatting during 1949 in the four states comprising the Southeastern district is expected to continue at about the same rate as in 1948 with the Cretaceous province continuing to attract most of the attention.

Geophysical work will doubtless show a continued decline in total crew weeks worked, with the gravity meter being the chief casualty. However, the gravity surveys made should be superior in quality to previous years in that the hasty reconnaissance has been replaced by more thorough, increased station density work.

Seismograph work should continue at about the same rate even though this type of survey is not held in very high esteem by most geologists in the Southeastern district. Considering the fact that practically all of the wildcats drilled in the district during the past 10 years were located on seismic "structures" it appears that there is still much to be desired in quality here.

Subsurface mapping continues to gain in importance each year as additional well control is acquired and this type of work will contribute more and more to the future discoveries in the district.

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DEVELOPMENTS IN ATLANTIC COASTAL STATES BETWEEN NEW JERSEY AND NORTH CAROLINA IN 1948[1]

HORACE G. RICHARDS[2]
Philadelphia, Pennsylvania

ABSTRACT

Oil activity in the Atlantic Coastal Plain declined during 1948. The only oil test in the region under consideration was a wildcat drilled in Hertford County, North Carolina. No oil or gas was found. The Piedmont area of New Jersey saw the completion of a wildcat near Millstone in Somerset County. Production continued in the Rose Hill Field in southwestern Virginia and there was also considerable activity elsewhere in the western part of that state.

COASTAL PLAIN

Oil activity in the Atlantic Coastal Plain declined during 1948. The only oil test in the region under consideration in this report was that of the Pam-Beau Drilling Company of Graham, North Carolina. This well is located 4.85 miles southeast of Cofield, Hertford County, North Carolina, about 150 yards southwest of Highway 45 to Harrellsville and about 300 yards northwest of the bridge over Wiccacon Creek. At the end of 1948, the well had reached a depth of 1,280 feet and was drilling in hard sandstone. Operations have been suspended, but further drilling is planned for 1949.

PIEDMONT REGION

New Jersey.—The well of the Van Horn Company on the Martin Dolak farm, ½ mile west of Millstone, Somerset County, New Jersey, was completed in May, 1948, at a reported depth of 2,380 feet. The entire section was in rocks of the Newark series of Triassic age. No traces of oil or gas were reported.

APPALACHIAN REGION

Maryland.—The well of the Columbia Carbon Company on the farm of Willis J. Dorr near Redhouse, Garrett County, Maryland, was completed in January, 1948, at a depth of 5,259 feet in rocks of Upper Silurian age. Nor oil or gas was reported.

Virginia.—Production continued in the Rose Hill field of southwestern Virginia. There was also considerable activity elsewhere in the western part of the state.

An important discovery was made in Buchanan County, where the Union Producing Company-Ritter Lumber V-1 obtained gas from Mississippian rocks at a depth of 2,301 feet (January, 30, 1948).

Among the dry wells can be mentioned one drilled by The California Company near Pearisburg, Giles County (Strader No. 1) which penetrated to Cambrian (?) rocks at a depth of 1,443 feet. The well was abandoned on June 10, 1948.

[1] Manuscript received, March 25, 1949.

[2] Associate curator of geology and paleontology, Academy of Natural Sciences of Philadelphia.

BULLETIN OF THE AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS
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DEVELOPMENTS IN CANADA IN 1948[1]

J. G. GRAY[2] AND W. A. ROLIFF[3]
Calgary, Alberta, and Toronto, Ontario

ABSTRACT

Exploration in Canada during the year was extremely active. The activity initiated in Alberta early in 1947 through the discovery of lucrative reef production at Leduc increased to major proportions in 1948. Exploration energies were almost entirely directed toward the search for Devonian reef production. Several discoveries of oil and gas were made in strata of post-Devonian age as incidental occurrences to this deeper exploration. A new trend to carry exploratory wells to the pre-Cambrian basement was established by the drilling of several wildcats to this horizon. This trend if continued will supply valuable subsurface data for future consideration of the productive possibilities of pre-Devonian strata. Although the year's activities were of major proportions compared with those of previous years they were of a confined nature when considered in terms of the great area of unexplored potentially productive lands in the sedimentary basin of Western Canada. The discovery of new oil and gas pools and the number of favorable showings encountered in many wells in strata of various geologic age testify to the capacity of the stratigraphic section to generate large volumes of liquid hydrocarbons. A new Devonian reef pool was discovered by the Imperial Oil Limited at Redwater, Alberta, approximately 45 miles northeast of the Leduc field. The Redwater reef and its geologic environment is similar in many respects to the Leduc reef but differs in the fact that it is a limestone reef instead of dolomite. It also contains a greater amount of recognizable fossil organic material. Four widely spaced wells have indicated a linear extent of the field of at least 8 miles. No attempt has been made to outline the width. The initial impression is that the Redwater field will exceed the Leduc field in areal extent and productivity. A significant oil discovery in the Rundle limestone was made by the Socony Vacuum Exploration Company near Craigmyle, Alberta. Completion of the well is now in progress. An oil discovery was made in a basal Lower Cretaceous sand near Hanna, Alberta. A Lower Cretaceous pool was discovered 2 miles north of the Leduc field. The Imperial Oil discovered a Devonian reef reservoir at Woodbend, 2 miles north of the Leduc field. The Woodbend field has the same reservoir characteristics as the Leduc field but it is not known whether the two are connected. Numerous discoveries of natural gas were made in widely separated areas. These discoveries were largely incidental to the prospecting for oil in deeper strata. In all, 399 wells were drilled in the province, accounting for a total footage of 1,700,397 feet of hole. Results indicated 202 oil wells, 19 gas wells, 1 condensate well, 133 dry holes and 44 wells drilling, standing, or testing at the end of the year. Production of oil increased during the year. Daily average for December was 37,785 barrels compared with 21,648 barrels per day during December, 1947.

Activities in Saskatchewan were confined largely to the development of the low-gravity Lower Cretaceous pool in the Lloydminster-Lone Rock area. A total of 92 wells produced 47,307 barrels of oil during December, 1948. Total production for the year amounted to 851,409 barrels as compared with 540,117 barrels produced during 1947. A limited amount of wildcat drilling was undertaken. Toward the close of the year several land reservations were made by independent operators with view to active wildcat prospecting and indications were that a revival of exploration activity on an important scale might occur in 1949. Attractive terms were being offered on Crown lands for prospecting purposes.

Activities in British Columbia were largely confined to the Peace River area where test drilling was being undertaken to develop natural gas reserves in Cretaceous strata. Seven wells were drilled in this area, resulting in three dry holes and four gas wells. Some activity was indicated in the Flathead area of southeastern British Columbia where active oil seeps are known in a faulted area of exposed Paleozoic strata. One gas test was drilled on Lulu Island near Vancouver. Total footage drilled in the province amounted to 18,478 feet. Total lands under permit for oil exploration were 2,099,682 acres.

Interest in Manitoba was maintained by the Brandon Exploration Company, a subsidiary of the California Standard Company. They conducted geological and geophysical surveys in the southwestern portion of the province from May to December. A limited amount of activity was reported by independent operators. One individual commenced drilling a gas well at the town of Brandon.

In Eastern Canada, 285 development wells were drilled in Ontario. Exploratory drilling consisted of 65 wells in southwestern Ontario, 1 in the St. Lawrence Lowlands, 5 in Gaspe, and 3 in New Bruns-

[1] Manuscript received, April 8, 1949. Many of the statistical data used in the preparation of the summary on Western Canada were provided by Floyd K. Beach, engineer, Petroleum and Natural Gas Conservation Board, Calgary. Many thanks are due him for his kindness in allowing access to his excellent recording of data.

[2] Administrative geologist, California Standard Company.

[3] Manager, eastern division, producing department, Imperial Oil Limited.

wick. Four small gas pools and one very small oil pool were discovered in Ontario. In one gas pool production was obtained in the Mount Simon sandstone of Cambrian age. Three important unsuccessful deep-pool tests were completed in Ontario. The Imperial Oil Limited had one geological party in Ontario and one in the Maritimes. The Shell Exploration New Brunswick Limited had three geological parties and one seismograph party active in the Maritimes.

Introduction

This paper describes the oil and gas developments throughout the Dominion of Canada during 1948. The Dominion is conveniently divided into two regions —Western Canada and Eastern Canada. The provinces of British Columbia, Alberta, Saskatchewan, and Manitoba are grouped together in Western Canada. Eastern Canada includes the remaining provinces of which Ontario, Quebec, New Brunswick, and Nova Scotia are the most important for oil and gas possibilities.

Western Canada

The year was one of great activity in Western Canada. Particular interest was centered on Alberta which received world-wide attention due to the continuing discoveries of Devonian-reef oil following on the discovery of the Leduc reef in 1947. Although exploration efforts were almost entirely directed toward the discovery of new Devonian-reef pools, significant oil and gas discoveries were also encountered in post-Devonian strata. Some of these will undoubtedly develop into new-pool discoveries in 1949.

Activity in British Columbia, Saskatchewan, and Manitoba remained at about the same level as in 1947. This was largely because Alberta was absorbing all of the available equipment and energies.

Oil production for the year was as follows.

Province	*Field*	*Production (Barrels)*	*Total*
Alberta	Turner Valley (Madison)	4,900,739	
	Leduc (D-2, Devonian)	863,332	
	(D-3, Devonian)	3,753,104	
	Woodbend (Devonian)	180,327	
	North Leduc (Blairmore)	40,935	
	Redwater (Devonian)	36,875	
	Lloydminster (Blairmore)	648,055	
	North Princess (Jefferson)	60,565	
	South Princess (Madison)	125,828	
	Conrad (Ellis)	179,627	
	West Taber (Blairmore)	122,332	
	East Taber (Blairmore)	79,195	
	Vermilion (Blairmore)	112,331	
	Bantry (Blairmore)	15,666	
	Wainwright (Blairmore)	17,131	
	Miscellaneous	17,868	
			11,153,910
Saskatchewan	Lloydminster-Lone Rock (Blairmore)	847,095	
			847,095
Northwest Territories	Norman Wells (Devonian)	349,768	
			349,768
			12,350,773

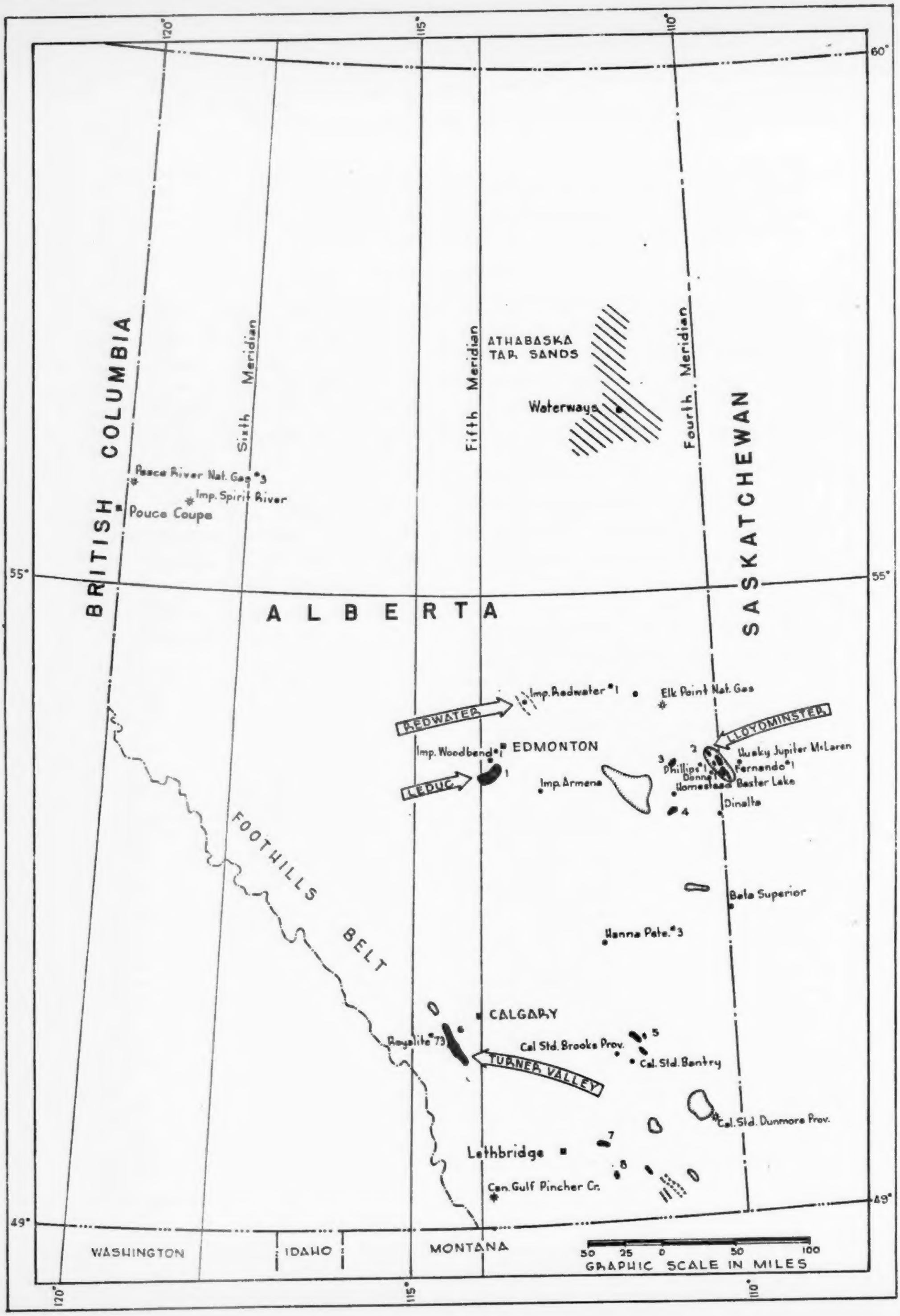

FIG. 1.—Map of Alberta showing discovery wells completed in 1948, producing oil fields and important gas fields. Oil fields: 1. Leduc, 2. Lloydminster, 3. Vermilion, 4. Wainwright, 5. Princess, 6. Turner Valley, 7. Taber, 8. Conrad.

The total production in Western Canada was 4,709,200 barrels greater than in 1947. This represents an increase of approximately 58 per cent. The estimated total consumption for the Prairie Provinces region of Western Canada during 1948 was 17,771,891 barrels of petroleum fuels.

The total footage drilled for oil and gas in Western Canada during 1948 amounted to 1,861,281 feet. Drilling in Alberta accounted for 1,700,397 feet, of which 490,019 feet was wildcat footage. The remainder includes development drilling footage and footage adjustments carried over from one year to another. The total footage drilled resulted in 202 oil wells, 19 gas wells, 1 condensate well, 133 dry holes, and 44 wells drilling, standing or testing at the end of the year. In Saskatchewan 72 holes were drilled or completed, accounting for 142,406 feet of hole, most of which was development drilling in the Lloydminster-Lone Rock area. Wildcat drilling accounted for 52,273 feet of this total involving 23 wildcat wells. Five of the wildcat wells were completed as discoveries. The total footage drilled in British Columbia amounted to 18,478 feet. Most of this drilling was done in the Peace River area exploring for gas reserves near Pouce Coupe. Manitoba reported one well being started near Brandon.

NEW FIELDS DISCOVERED

Redwater.—An important new Devonian-reef pool was discovered by the Imperial Oil Company at Redwater, Alberta, approximately 45 miles northeast of the Leduc field. The well completed drilling on September 25, 1948, after encountering 140 feet of productive zone. The character of the reef and its geologic environment is similar in many respect to the Leduc reef but differs in that the reef rock is limestone instead of dolomite. Both D-2 and D-3 porous zones are recognized as at Leduc but oil has been produced only from the D-3 zone. The D-2 zone has been found to be water-bearing. This may be due in part to the fact that the D-2 zone is close to the Devonian-Lower Cretaceous unconformity and is not entirely covered by the D-1 zone as at Leduc. Drilling has demonstrated that the surface of the unconformity is one of much topographic irregularity. The oil column has been indicated to be 140 feet thick. No gas cap is yet in evidence. Four widely spaced wells have indicated a linear extent to the field of at least 8 miles. No attempt has been made to outline the width. The initial impression is that the Redwater field will exceed the Leduc field in areal extent. Initial potentials of the wells average about 2,000 barrels per day after acid treatment. The gravity of the oil is 34° API, which is slightly lower than Leduc crude. Possible reserves have been estimated at 400,000,000 barrels.

Woodbend.—Commercial reef production in the Woodbend area was established by the Imperial Oil Company in its Woodbend well No. 1, which was completed at the total depth, of 5,323 feet on January 28, 1948. The Woodbend field is $2\frac{1}{2}$ miles north of the productive limits of the Leduc field. Both fields have the same lithologic and reservoir characteristics but it is not known that the two are connected. The D-3 zone is the principal producing zone although some encourage-

ment has been obtained in the D-2 zone and also in the Lower Cretaceous strata.

North Leduc.—A new Lower Cretaceous oil pool was discovered 2 miles north of the productive limits of the Leduc field. The oil is found in a quartz sand near the base of the Lower Cretaceous section. The discovery well, the Continental Oil Company's Leduc No. 3, was completed in Legal Subdivision 12, Sec. 7, T. 51, R. 25, W. of the 4th Meridian. The well was originally located to prospect Devonian possibilities but failed to encounter a reef at depth. It was plugged back and the casing perforated between 4,205 and 4,211 feet. The well was started on production at a flush flow of 35 barrels per hour of 39° API gravity oil. Development of this pool was in progress at the close of the year.

FIELD DEVELOPMENTS

Leduc.—An aggressive development program was conducted in the Leduc field throughout the year. One hundred and thirty-nine wells were drilled during the year, bringing the total producing wells to 172. Nine dry holes were drilled. Oil production was increased from 372,427 barrels at the close of 1947 to 4,616,436 barrels at the close of 1948. The productive limits of the field have not been outlined although the east end of the field has been well established. The field now covers 13,645 acres. Reserves have been estimated to exceed 200 million barrels. Considerable extension drilling was undertaken around the margins of the field and although some of the efforts resulted in dry holes, others established additional productive area. Much of this drilling indicated that the reef is irregular in outline, and accumulation of petroleum is controlled in a large measure by irregular reef build-ups above the main reef. Closure appears to be indicated on the northeast against the regional dip which is the apparent critical direction. Closure has not yet been indicated at the southwest although further drilling will undoubtedly prove closure in this direction also. So far, only one well has drilled completely through the reef. The D-3 zone has been proved to be the most productive zone in the field although the D-2 zone is a prolific producer in itself. The D-2 is less continuous, however, and has less well developed permeability than the D-3 zone. It has been found that a marginal tight zone is present in the D-2 along the east side of the field and it is thought that this condition has contributed to the trapping condition in the reservoir. The D-2 is separated from the underlying D-3 by a zone of green shale which is thinner across the crest of the D-3 reef and thicker on the flanks of the D-3 reef. Compaction of this green shale member has caused a draping effect in the D-2 and provided adequate structural reversal to form a satisfactory trap for oil and gas. This drape effect is also apparent in the Cretaceous marker horizons. So far it has not been definitely established that communication is present between the D-2 and the D-3 zones.

An important occurrence in the Leduc field which provided an impressive evaluation of the productive capacity of the D-3 reservoir was the volume of oil produced by the Atlantic's well No. 3, which flowed out of control for 193 days. During this time the well produced 1,225,904 barrels of oil and more than 9 billion cubic feet of gas. Daily flows ran as high as 15,000 barrels per day. The

well caught fire on September 6 and was killed by water flooding through relief holes on September 9. It was finally plugged on November 17.

Turner Valley.—Production in Turner Valley declined throughout the year. As in the previous year, drilling was largely confined to fill-in locations although some drilling was done in the north end in an attempt to extend the northern limits of the field. An important discovery of oil in a deeper faulted block of Madison limestone was made in the Royalites Well No. 73. The well was originally completed in the main Madison uplift at the depth of 6,271 feet in January, 1944. Following a careful study of the structural possibilities, it was decided by the Royalite Oil Company to deepen Royalite 73, in Legal Subdivision 9, Sec. 22, T. 20, R. 3, W. of 5th Meridian. It was deepened to 8,418 feet on September 13, 1948. The original top of the Madison was 5,700 feet; on deepening it topped the Banff limestone at 7,165 feet, faulted from Banff to Fernie at 7,485 feet, and encountered the Madison again at 7,630 feet. Porosity showed from 7,743 to 7,830 feet, and was repeated from 8,071 to 8,173 feet. The main porous zone showed from 8,343 to 8,390 feet with black limestone from 8,390 feet to total depth of 8,418 feet. The well was finally completed on October 20, 1948, and rated a flow of 155 barrels per day with a gas-oil ratio of 2,700. At the close of the year additional wells were being drilled to evaluate fully this important development which may initiate a new productive life for this field.

Lloydminster-Lone Rock.—The Lloydminster-Lone Rock productive area, which consists of a several separate pools of low-gravity Cretaceous oil, continued to develop during the year. Part of the area lies in Alberta and part in Saskatchewan. The Alberta part produced 648,055 barrels, which is an increase of 343,819 barrels over 1947. The Saskatchewan side increased production by 312,062 barrels, to bring its total production for the year to 847,095 barrels. Some extension drilling was undertaken and some attention was given to the possibilities for Devonian production, but no producing wells have been completed in this horizon in the field.

Refining capacity at Lloydminster was expanded during the year to take care of the increased production of the field. A monthly production record was established in August, when 166,106 barrels of oil were produced. Production was cut back in September to 127,500 barrels per month due to transportation and marketing difficulties. Some competition in the fuel oil market was provided by the Imperial oil refinery at Edmonton, which has not yet installed a cracking unit to treat the heavier ends of the Leduc crude and thus was displacing some Lloydminster crude in the fuel-oil market. When cracking facilities are installed it is expected some pressure will be relieved from the marketing problems of the Lloydminster crude.

Conrad.—No new wells were drilled within this field during the year. One wildcat was drilled 4 miles southeast of the productive limits of the field in an attempt to locate additional Basal Ellis oil but the well failed to encounter porosity in the objective sand and it was abandoned.

Taber.—No significant changes took place in either the East Taber or West

Taber fields during the year. Three wildcat wells were drilled in an attempt to develop new pools in Lower Cretaceous sands equivalent to those presently producing but all were unsuccessful due to a lack of porosity in the objective sands. One of these wildcats, Taber Province 77-1-A, discovered the presence of gas in the Bow Island sand and was completed as a potential gas well.

Three development wells were drilled in the West Taber field on a 20-acre spacing program.

Princess.—Activity in the North Princess field was confined to production of Devonian crude. No new wells were drilled during the year. Six development wells were drilled in the South Princess field in an attempt to extend the productive area of the Rundle (Mississippian) production. Several of these wells showed encouraging drill-stem tests but production difficulties were encountered after completion due to water intrusion.

Del Bonita.—Production for the year amounted to 8,433 barrels in this field. An interesting development was the spudding of a Devonian test in Legal Subdivision 4, Sec. 25, T. 1, R. 22, W. of the 4th Meridian, which is 1½ miles north of the productive limits of the field. This is the first attempt to prospect for a Devonian pool in this field which currently produces from the Madison.

IMPORTANT WILDCATS

Several important wildcats were completed during the year. Some of these indicated the possibility that new fields had been discovered. Others had obtained encouraging drill-stem tests but had not been completed by the close of the year.

In the southwest part of Alberta the Canadian Gulf Oil Company completed its Pincher Creek well No. 1 in the Madison limestone, after drilling to the total depth of 12,516 feet. The Madison limestone was topped at a depth of 11,700 feet. Testing of the complete limestone section was undertaken prior to completion in the upper part of the Madison. The potential established in the well was 1,100 barrels per day of 51.5° API crude, plus 44,000 MCF per day gas. The recorded bottom-hole pressure was 4,700 psi. The completed depth was 12,000 feet. Two follow-up wells were drilling at the end of the year. The Gulf's Fred Shrempp No. 1 was drilling in Legal Subdivision 4, Sec. 35, T. 3, R. 29, W. of the 4th Meridian, approximately 2 miles northeast of the discovery well. The Gulf's Walter Marr was drilling in Legal Subdivision 1, Sec. 29, T. 4, R. 29, W. of the 4th Meridian, approximately 7 miles north and west of the discovery well. This discovery is of importance as it may indicate a new high-gravity oil field in the foothills belt. The drilling was undertaken following extensive reflection and refraction seismic studies by the Canadian Gulf in the Pincher Creek-Waterton area. The area is one of much structural complexity since it lies adjacent to the trace of the Lewis overthrust.

A discovery of oil and gas in a basal Cretaceous sand was made in the Hanna Petroleum Campany's well No. 3, which was drilled near Hanna, Alberta, in Legal Subdivision 14, Sec. 5, T. 31, R. 14, W. of 4th Meridian. This well was

drilled to the total depth of 3,755 feet and completed as a producing well in the basal Cretaceous sand zone overlying the Rundle limestone. Casing was set at 3,736 feet and gun-perforated from 3,700 feet to 3,713 feet. The well flowed 32.7° API oil at a rate of 15 barrels per hour through a ½-inch choke. The potential and significance of the discovery were being established at the close of the year.

Oil was discovered in the Rundle limestone in the Socony's Craigmyle well which was drilled in Legal Subdivision 12, Sec. 32, T. 32, R. 16, W. of 4th Meridian, a few miles north of Craigmyle, Alberta. A formation test near the top of the Madison limestone at 4,050 feet flowed oil to the surface in 10 minutes. Following this testing, the well was drilling to its Devonian objective at the close of the year.

A basal Cretaceous sand discovery was completed near Bantry, Alberta, early in 1948. The well, the California Standard-Imperial's Bantry No. 1 was drilled to 4,823 feet and encountered impressive flows of oil in formation tests between depths of 3,243 feet and 3,259 feet. Casing was set at 3,316 feet and perforated between 3,253 and 3,259 feet. The producing zone is a quartzose sand in the basal part of the Lower Cretaceous strata equivalent in stratigraphic position to the Lower Cretaceous oil and gas sand in the Princess field, 15 miles northeast. It was placed on production in January, 1948, and produced more than 15,000 barrels of oil during the year. Two offset wells were drilled during the year but these failed to establish production and were abandoned.

Several other wildcats were completed as potential new-field discoveries during 1948. The Homestead's Baxter Lake No. 1 was completed in the Wainwright area in Legal Subdivision 2, Sec. 6, T. 47, R. 5, W. of 4th Meridian. The well was a Lower Cretaceous sand discovery and was completed with an initial potential of 100 barrels per day. The California Standard Company completed a small producing well in the basal Cretaceous sand zone in Legal Subdivision 16, Sec. 14, T. 19, R. 14, W. of 4th Meridian. The Imperial Oil Company completed its Armena No. 1 in Legal Subdivision 13, Sec. 10, T. 48, R. 21, W. of 4th Meridian, as a potential producer after encountering encouraging formation tests in the top of the Devonian strata. The well produced at an initial rate of 12 barrels per day of 40.3° API following its completion. A small Blairmore well was discovered in the Dina area through completion of the Dinalta well in Legal Subdivision 10, Sec. 25, T. 44, R. 1, W. of 4th Meridian. The well rated an initial potential of 27 barrels per day from the depth of 1,825 feet.

Seventeen wildcat wells were drilled in Saskatchewan during the year. Several of these were completed as potential discoveries. The Bata Superior's No. 1 was completed in Legal Subdivision 4, Sec. 16, T. 35, R. 28, W. of 3rd Meridian, near Compeer, as an indicated discovery in the Lower Cretaceous strata. This well was completed with an initial potential of 60 barrels per day of 14.2° API crude. The Husky Jupiter McLaren well was completed in Legal Subdivision 4, Sec. 6, T. 50, R. 25, W. of 3rd Meridian, in the Battleford area as a Colony sand discovery. It rated an initial potential of 30 barrels per day of 15.2° API crude. The Fernando well No. 1 was completed in the Lloydminster area in Legal Subdivision

SUMMARY OF SUCCESSFUL WILDCAT WELLS DRILLED DURING 1948* IN ALBERTA

A. OUTPOSTS (26 Drilled)

AREA	WELL	LOCATION	TOTAL DEPTH	RESULT	FORMATION REACHED	COMPLETION DEPTH	PRODUCING FORMATION	REMARKS
LEDUC	Continental #6	Lsd. 11-7-50-26 W.4	5194'	Oilwell	Devonian D-2	5194'	D-2	75 bbl/hr.
"	Home Leduc #23	Lsd. 7-3-50-26 W.4	5403'	"	" D-3	5403'	D-3	
"	Imperial #9	Lsd. 16-3-50-26 W.4	5466'	"	" D-3	5466'	D-3	126 bbl/day
"	Imperial #57	Lsd. 16-5-50-26 W.4	5435'	"	" D-2	5225'		
Lloydminster	C.L. #11	Lsd. 1-20-50-1 W.4	1944'	"	Blairmore	1944'	Colony Sand	60 b/d. 17°API.
"	Holly #3	Lsd. 1-22-50-2 W.4		"	"		Blairmore	30 b/d. 13.1°API.
"	Imperial B.B. Blackfoot #1	Lsd. 1-23-50-2 W.4	1969'	"	"	1969'	"	Non-commercial well.
"	Imperial B.B. Blackfoot #2	Lsd. 2-23-50-2 W.4	1964'	"	"	1964'	"	60 b/d 0.1% sand.
"	Imperial H.B. Lloyd #1	Lsd. 5-9-50-1 W.4	2079'	Gaswell	"	1979'	"	2000 mcf/day (D.S.T)
"	Imperial H.B. Lloyd #2	Lsd. 6-9-50-1 W.4	2001'	Gaswell	"	1910'	"	6250 mcf/d C.P. 455psi
"	Detromine #3	Lsd. 5-12-50-2 W.4	1992'	Oilwell	"	1932'	"	60 b/d, 15.7°API, 4% cut
"	Shamrock Phillips #1	Lsd. 6-21-50-1 W.4	1925'	"	"	1925'	"	50 b/d, 15.6API
POUCE COUPE	Peace River Nat. Gas #3	Lsd. 15-16-80-13 W.6	2169'	Gaswell	"	2169'	Gates Sandstone	32,000 mcf/day
TABER	California-Standard T.P. 77-1-A	Lsd. 13-1-9-17 W.4	3322'	Gaswell	Rundle Limestone	2204'	Bow Island Ss.	3500 Mcf/day
VERMILION	Elk Point Nat. Gas	Lsd. 11-6-57-6 W.4	1376'	"	Blairmore	1376'	Blairmore	1300 Mcf/day 420# psi

B. DEEPER POOL TESTS (2 Drilled)

AREA	WELL	LOCATION	TOTAL DEPTH	RESULT	FORMATION REACHED	COMPLETION DEPTH	PRODUCING FORMATION	REMARKS
TURNER VALLEY	Royalite #73	Lsd. 9-22-20-3 W.5	8414'	Oilwell	Madison	8414'	Madison	Found production in repeated Madison rock.

C. NEW POOL WILDCATS (8 Drilled)

AREA	WELL	LOCATION	TOTAL DEPTH	RESULT	FORMATION REACHED	COMPLETION DEPTH	PRODUCING FORMATION	REMARKS
LEDUC	Continental #3	Lsd. 13-7-51-25 W.4	5534'	Oilwell	Devonian	4211'	Blairmore	9½ bbl/hr. 37.4° API.
LLOYDMINSTER	Husky Jet Staplehurst	Lsd. 12-27-50-1 W.4	2052'	Oilwell	Blairmore	1894'	Blairmore	25 b/d; 14.6° API, 3% cut

D. NEW FIELD WILDCATS (114 Drilled)

AREA	WELL	LOCATION	TOTAL DEPTH	RESULT	FORMATION REACHED	COMPLETION DEPTH	PRODUCING FORMATION	REMARKS
BROOKS	California Standard Brooks 36-14	Lsd. 16-14-19-14 W.4	3646'	Oilwell	Rundle	3348'	Sunburst Sandstone	10 b/d; 29.7° API
CAMROSE	Imperial Armena #1	Lsd. 13-10-48-21 W.4	4998'	Oilwell	Devonian	4177'	D-1 Devonian	12 b/d; 40.3° API
DINA	Dinalta	Lsd. 10-25-44-1 W.4	1625'	Oilwell	Blairmore	1625'	Blairmore	27 b/d
FOREMOST	California Standard	Lsd. 11-27-4-11 W.4	2988'	Gaswell	Rundle	2060'	Bow Island Sandstone	2800 Mcf/day.
FOREMOST	California Standard	Lsd. 10-30-5-11 W.4	3029'	Gaswell	Rundle	2050'	Bow Island	1700 Mcf/day.
GHOST RIVER	Romana 4K	Lsd. 1-31-27-6 W.5	11,915'	Small Gaswell	Blairmore	9540'?	Dalhousie Sand ?	
HANNA	Hanna Petroleums #1	Lsd. 8-5-32-15 W.4	4180'	Gas condensate	Rundle	3822'	Sunburst Ss.	10,000 Mcf/day Some condensate.
"	Hanna Petroleums #3	Lsd. 14-5-31-14 W.4	3753'	Oilwell	Sunburst	3715'	Sunburst Ss.	15 b/hr. 32 API.
LEDUC	Imperial Woodbend 1	Lsd. 5-15-51-26 W.4	5340'	Oilwell	Devonian D-3	5323'	D-3	143 b/d; 39.6 API.
MEDICINE HAT	California Standard	Lsd. 11-5-11-4 W.4	3445'	Gaswell	Rundle	3323'	Ellis	4900 Mcf/day(D.S.T.)
MORINVILLE	Imperial Legal #2	Lsd. 1-17-58-24 W.4	4008'	Gaswell	Devonian		Viking	5000 Mcf/day(plugged)
"	Imperial Morinville #2	Lsd. 8-11-56-25 W.4	4320'	Gaswell	Devonian		Blairmore	4000 Mcf/day(plugged)
REDWATER	Imperial Redwater 1	Lsd. 1-32-57-21 W.4	3264'	Oilwell	Devonian D-3	3218'	D-3	75 b/hr; 34° API
"	Imperial Redwater 4	Lsd. 3-14-58-22 W.4	4476'	Oilwell	"	3314'	D-3	45 b/hr.
VERMILION	Homestead Baxter Lake #1	Lsd. 2-8-47-5 W.4	2376'	Oilwell	Blairmore	2039'	Blairmore	100 b/d.
VIKING	Mannville #1	Lsd. 4-30-50-8 W.4	1800'	Gaswell	"	1400'	Viking Ss.?	11 Mcf/day.
WATERTON	Can. Gulf Pincher Creek #1	Lsd. 15-24-3-29 W.4	12,516'	Rundle	Rundle	12,000'	Rundle	44,000 Mcf/day; 1100 b/d condensate.

* Data compiled by Floyd K. Beach, Petroleum and Natural Gas Conservation Board, Calgary.

SUMMARY OF SUCCESSFUL WILDCATS DRILLED DURING 1948 in SASKATCHEWAN*

A. NEW FIELD WILDCATS (17 Drilled)

AREA	WELL	LOCATION	TOTAL DEPTH	RESULT	FORMATION REACHED	COMPLETION DEPTH	PRODUCING FORMATION	REMARKS
KINDERSLEY	Bata Superior #1	Lsd. [illegible]-16-35-28 W.3	2625'	Oilwell	Blairmore	2625'	Blairmore	60 b/d, 14.2°API, 6.7% cut.
BATTLEFORD	Husky Jupiter McLaren	Lsd. 4-6-50-25 W.3	2211'	"	"	1670'	Colony Sand	30 b/d; 15.2°API, 7.8% cut.
LLOYDMINSTER	Fernando #1	Lsd. 5-3-49-27 W.3	1869'	"	"	1853'	Blairmore	60 b/d; 15.4° API. Small cut.
"	Donna #1	Lsd. 8-4-49-27 W.3	1912'	"	"	1912'	"	55 b/d; 15.4° API. Small cut.

B. OUTPOSTS (4 Drilled)

AREA	WELL	LOCATION	TOTAL DEPTH	RESULT	FORMATION REACHED	COMPLETION DEPTH	PRODUCING FORMATION	REMARKS
LLOYDMINSTER	Phillips #1	Lsd. 5-10-49-27 W.3	1894'	Oilwell	Blairmore	1837'	Blairmore	50 b/d; small cut.

C. NEW POOL WILDCATS (2 Drilled)

No successes.

* Data compiled by Floyd K. Beach, Petroleum and Natural Gas Conservation Board, Calgary.

5, Sec. 3, T. 49, R. 27, W. of 3rd Meridian as the Dulwich pool discovery. The initial potential of the well was 60 barrels per day of 15.4° API crude.

NATURAL-GAS DEVELOPMENTS

Numerous discoveries of natural gas were made throughout Alberta in 1948. Additional gas reserves were developed in the Peace River area of British Columbia.

Most of the gas discoveries were incidental to the prospecting for oil production. Consequently, the greatest number of new gas occurrences was recorded in those areas where deep drilling was most active, such as in the general area north of Edmonton. It was established that the Viking sand zone (Upper Cretaceous) and the sands of the Lower Cretaceous strata contain very large reserves throughout this general region.

Reserves in Southern Alberta were extended by wildcat and extension drilling in the Foremost, Medicine Hat, Dunmore, and Taber areas. Zones which have been proved to be productive in Southern Alberta range from Devonian to uppermost Cretaceous in age.

An important inquiry into the natural-gas reserves of Alberta was undertaken by a commission set up by the Provincial Government. It was established at this inquiry that Alberta contains upward of 4 trillion cubic feet of proved and probable reserves. Considerable attention was being given to the possibilities of exporting natural gas from the province and pipeline surveys to the Pacific Coast had been completed by at least one group.

GENERAL

The year 1948 was the most important development year in the history of the Canadian oil industry. The establishment of widespread occurrence of reef-bearing dolomite within the great sedimentary basin of Western Canada opened great prospective areas and stimulated all phases of the industry. Geophysical prospecting was still the most popular method of exploration with particular emphasis on the reflection-seismic method. A tabulation of geophysical crews employed indicated that in mid-summer Alberta was the third most active exploratory area in North America. At the close of the year more than 65 geophysical crews were operating in the province. More than 80 drilling rigs were at work with additional rigs scheduled to start in the new year.

The entry of many new companies into active operation in Western Canada increased the competitive effort, particularly with respect to land acquisition. New regulations concerning the acquisition of mineral rights on Crown lands in Alberta and Saskatchewan were introduced by the governments of each province. In general, Alberta introduced restrictive measures whereas Saskatchewan showed a tendency to relax limitations in order to encourage prospecting. The Alberta Government realized a sizeable income from the sale of Crown reserves acquired in new-field discoveries through the regulation requiring that equivalent

Crown reserves be set up when selecting leases from exploratory reservations. Various methods of disposing of these reserves to the industry by sealed tender were tried.

Oil reserves in the western provinces were increased many-fold during the year and it was apparent that self-sufficiency for Western Canada was in sight. Leduc was estimated to contain at least 200 million barrels and Redwater was expected to exceed this reserve by at least twice. In view of the apparent large reserve and encouraging prospects, plans were being made by the Imperial Oil Company to build a pipeline from Edmonton, Alberta, to Regina, Saskatchewan. It was also anticipated that refinery capacity would be appreciably increased in the near future.

Eastern Canada

Eastern Canada consists of the provinces of Ontario, Quebec, New Brunswick, Nova Scotia, and Prince Edward Island. There are six principal sedimentary

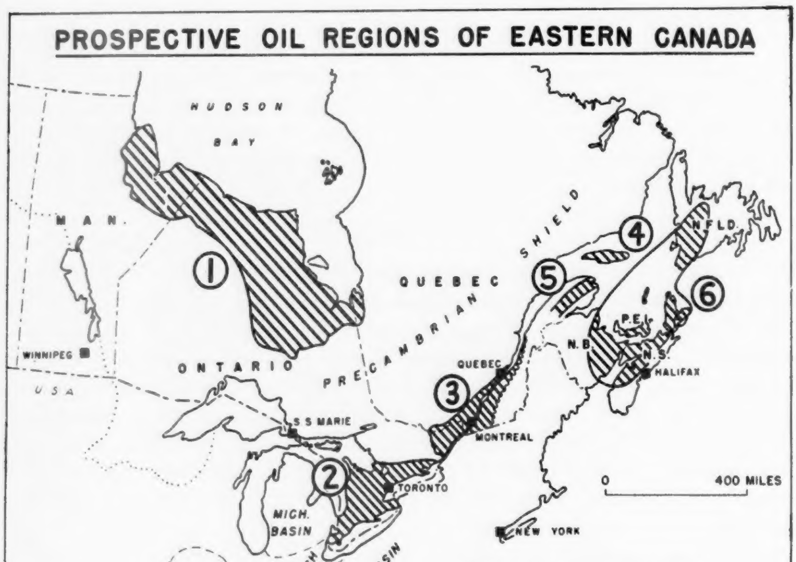

FIG. 2.

basins in this area, as indicated in Figure 2. During the year 1948, exploratory work and development drilling were carried on in southwestern Ontario, the St. Lawrence Lowlands, Gaspe, and the Maritimes.

SOUTHWESTERN ONTARIO

During 1948, about 350 wells were completed in southwestern Ontario, compared with 400 in 1947. Of the total drilled, 61 were new-field wildcats, and 3 were deeper-pool tests, 14 of which were drilled to depths of less than 600 feet in search of shallow Devonian oil; 37 to depths of 1,400–2,200 feet for oil and gas in the Salina-Guelph (Silurian), and 14 to depths of 470–4,220 feet for oil and gas in the Ordovician. Only five of these were successful in discovering small unimportant pools. Of the development wells completed, 120 were gas wells, mostly with initials of less than 100 MCF per day; 18 were oil wells with initials varying from 2 to 70 barrels a day, and the remainder were dry holes.

Total production in southwestern Ontario amounted to about 175,000 barrels of oil, and about 9,000,000 MCF of gas, compared to 130,135 barrels and 8,516,388 MCF in 1947.

NEW FIELDS DISCOVERED IN SOUTHWESTERN ONTARIO

Only five small pools were discovered in southwestern Ontario in 1948, as follows (Fig. 3).

	County	*Township*	*Estimated Ultimate*	*Producing Formation*
Staples	Essex	Tilbury W.	300,000 MCF	Guelph (Silurian)
New Wheatley	Kent	Romney	50,000 MCF	Guelph (Silurian)
Electric	Kent	Dover	400,000 MCF	Mount Simon Ss. (Cambrian)
Dante	Lambton	Euphemia	8,000 Bbls.	Dundee Equiv. (Devonian)
Mosald	Elgin	Aldborough	2,000,000 MCF	Guelph (Silurian)

The discovery made by the Union-Imperial's Electric well No. 1 (500 MCF a day from the depth of 3,986 feet) marks the first commercial gas production from the basal beds in southwestern Ontario. The potentialities of this area have not yet been determined, since only three wells have been drilled. The gas appears to occur in a stratigraphic trap.

IMPORTANT EXPLORATORY WELLS IN SOUTHWESTERN ONTARIO

There were four important exploratory wells completed which tested the entire sedimentary section. The Union-Imperial's Electric No. 1, in the north part of Dover Township, drilled on the downthrown side of an east-west-trending fault of more than 200 feet displacement failed to produce from the Trenton (Ordovician), although the only commercial Trenton field in Ontario (Dover field) in the south part of Dover Township, produces from a syncline along the downthrown side of an east-west-trending normal fault. The well, however, produced an initial of 500 MCF of gas in the basal beds, probably the Mount Simon sandstone of Cambrian age, from what appears to be a stratigraphic trap.

The Union-Imperial's D'Clute No. 1, in the D'Clute gas field (producing

from Guelph of Silurian age) was drilled to the basal beds, and failed to produce from them or from the overlying Trenton-Black River (Ordovician). Structure contours on top of the Guelph (Silurian) suggested the presence of a north-south-trending elongate dome, but as the Imperial's D'Clute well No. 1 encountered a Guelph section thicker than normal, the apparent structure in this area may be a reef, and structure may not be present on the top of the Trenton.

The Imperial's Becher No. 32 was drilled on a dome of about 3,000 acres having a closure of 40 feet or more, as outlined on the lower producing beds of the Salina (Silurian), to test the Trenton possibilities in the Becher field which

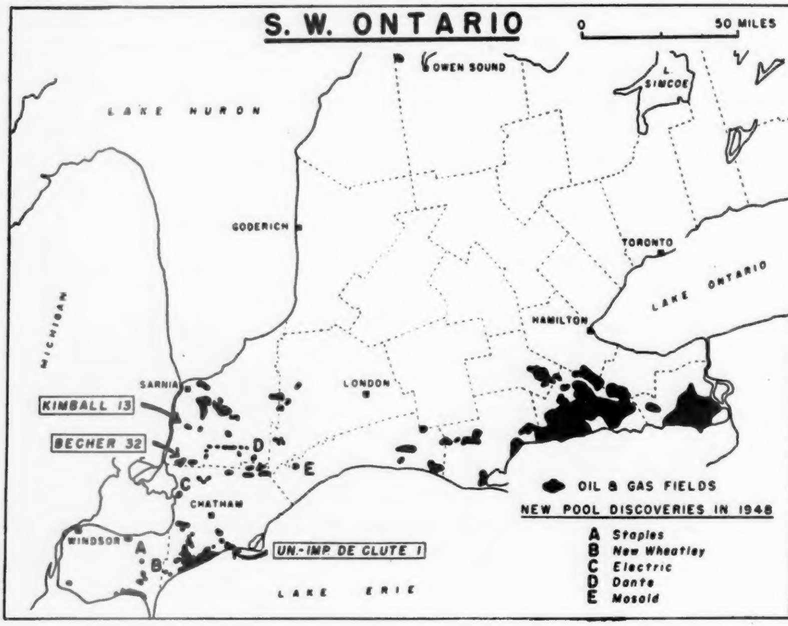

FIG. 3

produces oil and gas from the Salina. The well failed to obtain any showings of oil or gas in the Trenton, or in the basal beds.

The Imperial's Kimball No. 13 was drilled as a "Trenton" test in the Kimball field which produces from the Salina (Silurian). It was located on a dome of about 2,500 acres and with 60 feet of closure, but failed to obtain any showings in the Trenton or in the basal beds. The Blue Mt.-Collingwood formation overlying the Trenton was thin in this well, suggesting that folding may have taken place in the area around the close of Trenton time.

ST. LAWRENCE LOWLANDS

This basin, comprised almost entirely of Ordovician sediments, has an area of about 10,000 square miles, and a maximum thickness of 7,000–8,000 feet of shales, limestones, and dolomites, with some sandstones in the lower part of the section. The prospective productive zones are the Trenton and lower beds of Ordovician and Cambrian age. Commercial amounts of oil or gas have not been

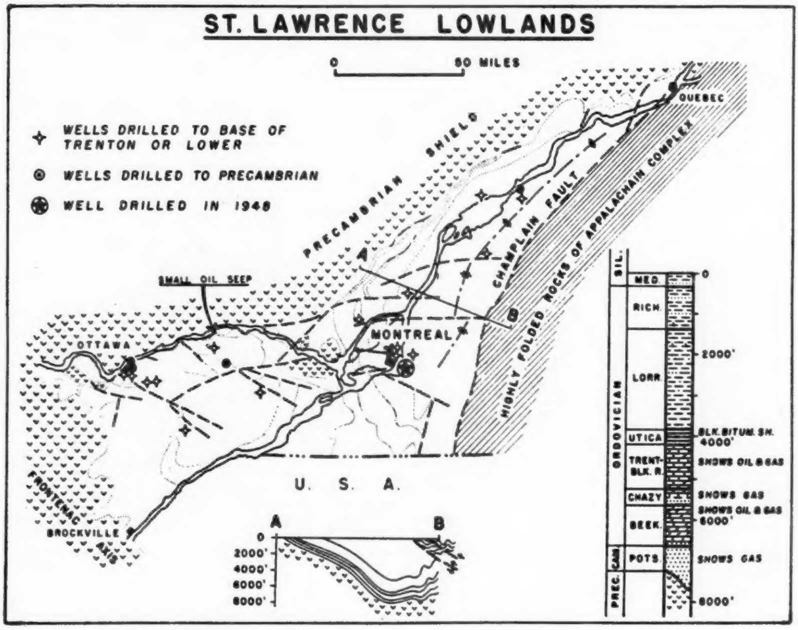

FIG. 4

encountered, but only 20 wells have reached the base of the Trenton-Black River formations. During 1948, one well was drilled in this basin at St. Hubert, a few miles east of the city of Montreal (Fig. 4). This well reached a depth of 4,072 feet and encountered the top of the Potsdam (Cambrian) at 3,854 feet. On the basis of surface geology, the well appears to be located near the crest of an anticlinal fold. Good showings of gas have been obtained in a few other wells in the Potsdam. It is not known if this well will be continued through the Potsdam.

GASPE PENINSULA

Commercial oil or gas has not been encountered in this area, but numerous structures and seepages are present, and 62 wells have been drilled, many of

which had good showings of oil and gas in the Devonian sandstones and in the upper part of the Devonian limestones. During 1948, drilling was active on five wells in this area, the most significant of which were the Gaspe Oil Ventures well No. 3 and the Imperial's Gaspe well No. 1 (Fig. 5). The Gaspe Oil Ventures well No. 3 in Galt Township, about 10 miles northwest of the town of Gaspe, is located on a well defined dome of about 8,000 acres, and commenced drilling in the Devonian sandstones. The Devonian limestone was reached at 2,000 feet and at the end of the year the well was at 2,394 feet. Small showings of oil were encountered at 2,298–2,315, 2,369–2,385, and 2,392–2,394 feet. The Imperial's Gaspe well No. 1 had reached a depth of 6,360 feet and is bottomed in what has

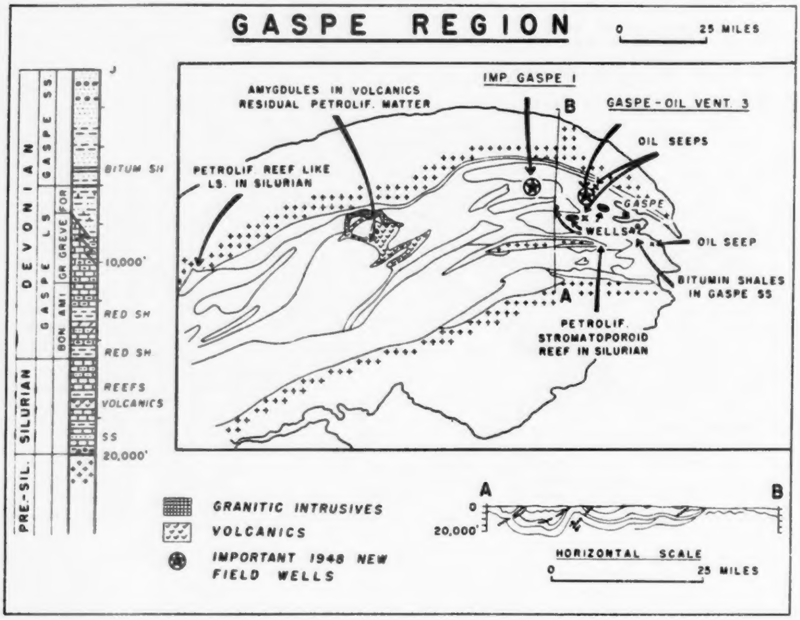

FIG. 5

been tentatively correlated with the Gascons formation of Silurian age. The well commenced in rocks of probable Silurian age, and the strata penetrated consisted largely of silty limestones and siltstones, with some thin reefy material which was oil-stained at 1,250 feet and 2,600 feet. The structure is a thrust-faulted anticlinal fold with dips of 30°–50°. It is located in Fletcher Township about 30 miles northwest of the town of Gaspe.

MARITIMES BASIN

This basin has an area of about 25,000 square miles, and is underlain by sediments of Pennsylvanian and Mississippian age. The area has one commercial

field, the Stoney Creek field in New Brunswick, which produces from the Albert formation of Mississippian age (Fig. 6). Production in 1948 amounted to approximately 21,700 barrels of oil, and 420,000 MCF of gas, compared with 23,128 barrels and 489,602 MCF in 1947.

During 1948, two development wells were commenced in the Stoney Creek field, and three wildcats were completed. The Shell Exploration New Brunswick Limited had three geological parties and one seismograph party in New Brunswick

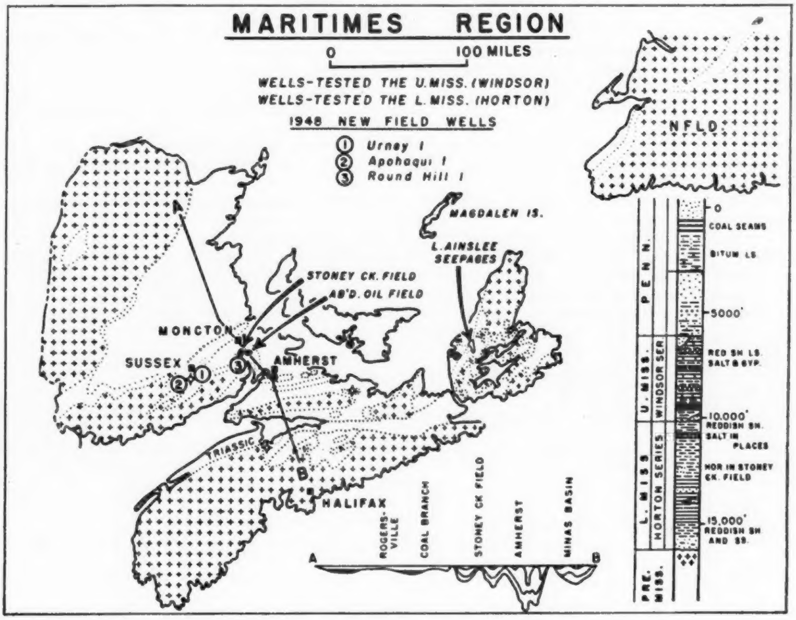

FIG. 6

and the Imperial Oil Limited had one geological party carrying out stratigraphic studies in the Maritimes area. The Shell Company's Urney No. 1, located 8 miles east of the town of Sussex, and 36 miles southwest of the Stoney Creek gas and oil field, commenced in the Albert formation, on the axis of an anticlinal fold, and was abandoned at a depth of 5,343 feet, in the basal part of the Albert. The Shell's Apohaqui No. 1, about 5 miles west of Sussex, was abandoned at a depth of 2,472 feet. The New Brunswick Oilfields drilled a wildcat at Round Hill in Hillsborough Parish, about 6 miles south of the Stoney Creek field which was abandoned at 3,387 feet. The well penetrated redbeds from top to bottom. The Shell Company is continuing seismograph work and will include refraction work in addition to the reflection surveys previously carried out. This company is also contemplating placing a gravimetric party in the area during the coming season.

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BULLETIN OF THE AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS
VOL. 33, NO. 6 (JUNE, 1949), PP. 1029-1124, 16 FIGS.

HIGHLIGHTS ON 1948 DEVELOPMENTS IN FOREIGN PETROLEUM FIELDS[1]

L. G. WEEKS[2]
New York, N. Y.

SUMMARY

Highlights on 1948 developments in the search for, and exploitation of, petroleum in 70 foreign countries are presented in the main paper. A table at the end of the main paper gives cumulative oil production through 1948 and daily averages for 1939, 1947, and 1948 for all countries and major world subdivisions. Another table at the end of the main paper shows the distribution over the world of geological and geophysical effort in crew months for 1948.

Measured in dollars spent, in geological and geophysical crews active, or in drilling rigs operating, the total effort put into the search for and development of petroleum fields abroad in recent years was much less than half of that in the United States. However, the amount of oil found in 1948 and the percentage increase in oil produced in 1948 over 1947 in foreign countries were each more than double the domestic. This marks a continuation of the general trend in recent years. Domestic and foreign production in 1948 were respectively 59% and 41% of the world total of 3,420 million barrels (9,343,000 barrels daily).

Table I accompanying this summary gives daily average production, percentage of total, and percentage increases since 1930 by major world subdivisions. Table I shows a 12.9% production increase for the world in 1948 over 1947, as compared with a 9.6% increase for 1947. This 1948 increase is the result of 20.0% foreign and 8.4% domestic increases, compared with 14% and 7% increases, respectively, shown last year. The largest percentage increase in 1948 (144.4%) was in Indonesia as a result of rehabilitation progress in the Borneo and Sumatra fields, though production was still 21.1% short of that of 1939. The largest continuous increase over recent years was in the Middle East, with an increase in 1948 of 36.1% over 1947 (as compared with the 19% increase that we showed last year) and 257.7% over 1939. The balance of Asia, though up 3.4% in its production over 1947, was still 65.7% below 1939 mainly because very little in the way of rehabilitation has as yet been accomplished in the large Burma fields and refineries which were almost completely destroyed during the war. Europe had an 8.5% increase over 1947, but was still 12.7% below 1939, the last pre-war year. Most prominent in the Western Hemisphere is Canada, with a production increase of about 62.5% over that of 1947 as a result of two of the most outstanding discoveries in the Western Hemisphere during the past two years. Noteworthy also is Venezuela, whose production increase (12.4%) for the year 1948 was approximately the same as that for 1947, and was up 137.9% over 1939.

A great deal of thought has been given to the development and use of yardsticks or standards for estimating potential or discoverable oil reserves. Here are listed some of the methods developed and used by the author.

1. Area of basin or part of basin times the percentage of the area which it is estimated will prove oil-bearing, times the estimated per acre yield.
2. Yield per acre of basin or subdivision thereof.
3. Barrels of oil per cubic mile (cubem) or per cubic kilometer (cubek) of sediments.
4. Barrels of oil per cubem or cubek of effective sand or other reservoir facies.
5. Use of percentage porosity volumes or facies ratios.
6. History curves to show rate of oil discovered per unit of exploratory effort (there are a number of such units that may be used), per unit of sediment volume, per unit of basin area, *et cetera.*

It is probably true that no yardstick can be developed to-day which will be precise, and none can be used blindly. There is no magic in them. They are merely tools and the development of them is not enough. The development and use of yardsticks stem from and are based on a combination of the exploration experience of the industry and world wide studies of all classes and conditions of basins. Their application presupposes a knowledge of fundamental principles involved.

Successful use of any yardstick or standard for estimating discoverable petroleum reserves requires sound and balanced judgment. For such judgment very much more than geologic information and exploration history is necessary. It flows from a recognition of critical information and an understanding of what that information means, from experience in its analysis.

No two basins are alike, even though they may be of the same class or genetic origin and of similar architecture. Each genetic type or class of basin has certain definite major elements in its architec-

[1] Manuscript received, March 14, 1949. Published by courtesy of Standard Oil Company (New Jersey).

[2] Chief research geologist, Standard Oil Company (New Jersey).

ture or framework. The incidence of oil occurrence may vary more between these different major elements or parts of any basin than it does between two quite different classes of basins. The entire area of certain major parts of the most prolific of basins may be barren or largely barren of oil. Again, the present structure basin may constitute but a fraction of the original deposition basin to which oil occurrence is fundamentally related.

As a general rule, any of the yardsticks can be more safely applied to large regions than to individual basins, countries or areas. The general tendency is to arrive at underestimates for the more prolific basin areas and to greatly overestimate the potentialities of the larger, less important basin areas or regions.

INTRODUCTION

This is the third year that this writer has reported to the Association on production, and on exploitation and exploration developments in the 60–70 countries of the world outside of the United States that have been active in the search for, or development of, petroleum.

As last year, the summary at the head of this paper actually constitutes an analysis of production and percentage relations over the past 19-year period by major world subdivisions. It would be difficult to make a true abstract of developments for so many countries and it was felt that the summary analysis would be of more interest and value.

The maps used in previous years showing the main sedimentary basins and the oil fields of the world have been brought up to date insofar as time has permitted, and several new maps have been added. At the close of the paper is a table of cumulative production through 1948 and average daily yield for the years 1939 (the last pre-war year), 1947, and 1948 for each country and major world subdivisions. Another appended table gives the geological activity in party months and geophysical activity by methods in crew months for 70 countries of the world.

It will be appreciated that there is a lack of information on some countries, particularly in eastern Europe.

The greater part of the highlights papers for 1946 and 1947 was prepared by the writer. He finds that the task of assembling, organizing, and writing these reviews and preparing the many tables and maps is too great for one man busy with other problems. Data for the full 12 months of the year do not become available for many foreign countries until February or even March, and most of the organization, compilation, and checking of the large and heterogeneous amount of data into some semblance of uniform style must be done in late February in order that typing and printing may be completed to meet the mid-March deadline set by the Association editors for receipt of the final paper. For these reasons the author has this year enlisted the aid of many men most familiar with the operations in the various areas and countries in an attempt to ease his editorial work somewhat. This course has seemed advisable also in the interest of greater accuracy of reporting and completeness of coverage. The writer and the readers are indebted to the following persons for supplying part to all of the data used for the country mentioned opposite each name.

ALASKA—Ralph L. Miller, geologist in charge, Naval Oil Unit, and W. H. Myers, United Geophysical Company, through the medium of A. A. Curtice, formerly of Hoover, Curtice, and Ruby and now president of Conorado Petroleum Company

TABLE 1. DAILY AVERAGE OIL PRODUCTION AND PERCENTAGE RELATIONS

Country or Region	1930		1939		1947		1948		% Increase, 1948 Over		
	Barrels	%	Barrels	%	Barrels	%	Barrels	%	1930	1939	1947
United States	2,460,304	63.7	3,465,649	60.9	5,085,200	61.4	5,510,000	59.0	124.0	59.0	8.4
Balance N. America	112,571	2.9	137,867	2.4	174,500	2.1	192,800	2.1	71.3	39.8	10.5
Total N. America	2,572,875	66.6	3,603,516	63.3	5,259,700	63.5	5,702,800	61.1	121.7	58.3	8.4
Venezuela	374,436	9.7	562,829	9.9	1,190,800	14.4	1,338,760	14.3	257.5	137.9	12.4
Balance S. America	144,726	3.7	213,432	3.7	229,800	2.8	231,170	2.5	59.7	8.3	0.6
Total S. America	519,162	13.4	776,261	13.6	1,420,600	17.2	1,569,930	16.8	202.4	102.2	10.5
Total W. Hemisphere	3,092,037	80.0	4,379,767	76.9	6,680,300	80.7	7,272,730	77.9	135.2	66.1	8.9
Europe, excl. Russia	132,737	3.4	159,722	2.8	128,500	1.6	139,360	1.5	5.0	-12.7	8.5
Middle East, incl. Egypt	133,526	3.5	329,055	5.8	864,700	10.4	1,177,000	12.6	781.5	257.7	36.1
Balance Asia, excl. Russia	28,060	0.8	34,416	0.6	11,400	0.1	11,790	0.1	-58.0	-65.7	3.4
Indonesia	127,940	3.3	179,937	3.2	58,100	0.7	142,000	1.5	11.0	-21.1	144.4
Africa, excl. Egypt	44	-	-	-	-	-	-	-	-	-	-
Total E.Hem. excl. Russia	422,307	11.0	703,130	12.4	11062,700	12.8	1,470,150	15.7	248.1	109.1	38.3
Russia	349,000	9.0	611,319	10.7	535,000	6.5	600,000	6.4	71.9	-1.9	12.1
Total E. Hemisphere	771,307	20.0	1,314,449	23.1	1,597,700	19.3	2,070,150	22.1	168.4	57.5	29.6
Total World	3,863,344	100.0	5,694,226	100.0	8,278,000	100.0	9,342,880	100.0	141.8	64.1	12.9
Total Foreign	1,403,040	36.3	2,228,577	39.1	3,192,800	38.6	3,832,880	41.0	173.2	72.0	20.0

CANADA—F. L. Fournier, staff geologist, Imperial Oil Ltd., Canada
GUATEMALA—R. C. Harris, chief geologist, Atlantic Refining Company
NICARAGUA—R. C. Harris, chief geologist, Atlantic Refining Company, and C. H. Neff, geologist, Gulf Oil Corporation
PANAMA—C. H. Neff, geologist, Gulf Oil Corporation, and Sinclair Oil Corporation
BAHAMAS—M. A. Dresser, staff geologist, Standard Oil Company (N. J.)
TRINIDAD—H. H. Suter, chief geologist, Trinidad Leaseholds, Ltd.
VENEZUELA—Creole Petroleum Corporation, Venezuela
COLOMBIA—C. F. Dohm, chief geologist, Tropical Oil Company
PERU—A. W. Landes and L. A. Smith, division geologists, International Petroleum Company, Ltd.
CHILE—Eduardo Simian G., production manager, Corporacion de Fomento de la Produccion, Chile
BOLIVIA—Guillermo Mariaca, general manager, Yacimientos Petroliferos Fiscales Bolivianos
PARAGUAY—Earl B. Noble, manager of exploration, Union Oil Company of California
BRAZIL—Avelino I. de Oliveira, counselor and member of the executive commission of Conselho Nacional do Petroleo of Brazil
GREAT BRITAIN—George M. Lees, chief geologist, Anglo-Iranian Oil Company, Ltd.
FRANCE—Henry de Cizancourt, service géologique, Compagnie Francaise des Pétroles, Paris, France
NETHERLANDS—A. J. Mulder, regional geologist, N. V. de Bataafsche Petroleum Maatschappij, through courtesy of H. M. E. Schurmann, chief geologist
GERMANY—Ludwig Happel, geologist, Gewerkschaft Brigitta through courtesy of H. M. E. Schurmann, chief geologist, N. V. de Bataafsche Petroleum Maatschappij; and Otto Hermann, chief geologist, Deutsche Vacuum Oel A.G. Cooperation of the Reichsamt für Bodenforschung and geologists of German oil companies in furnishing data is also gratefully acknowledged
DENMARK—C. H. Neff, geologist, Gulf Oil Corporation
AUSTRIA—B. H. Grove, geologist, Socony-Vacuum Oil Company
HUNGARY—Raoul Vajk, geophysicist, Standard Oil Company (N. J.)
RUMANIA—J. T. Mantsch, producing coordination department, Standard Oil Company (N. J.)
ITALY—Carl Wiedenmayer, chief geologist, Societa Petrolifera Italiana
SPAIN—M. San Miguel de la Camara, dean, School of Science, University of Madrid, Spain
PORTUGAL—Rex M. F. Townsend, vice-president, Exploration Contractors, Inc., N. Y.
SPANISH MOROCCO—M. San Miguel de la Camara, dean, School of Science, University of Madrid, Spain
FRENCH MOROCCO, ALGERIA, TUNISIA—George C. F. Greant, division geologist, Standard Oil Company (N. J.)
NIGERIA—Director, Geological Survey of Nigeria
FRENCH EQUATORIAL AFRICA—Henry de Cizancourt, service géologique, Compagnie Francaise des Pétroles, Paris, France
ANGOLA—Henrique Vieira, engineer of mines, Reparticao Central dos Servicos de Geologia e Minas, Luanda, Angola
MADAGASCAR—Henry de Cizancourt, service géologique, Compagnie Francaise des Pétroles, Paris, France
EGYPT—Fawzi Iskander, geologist, Standard Oil Company of Egypt, S.A.
ETHIOPIA—Frederic A. Bush, chief geologist, Sinclair Oil Corporation
TURKEY—Cevat E. Tasman, chief petroleum adviser of M.T.A. Institute (Mining Research and Exploration Institute), Turkey
IRAQ, SYRIA, PALESTINE, CYPRUS, TRANSJORDAN, QATAR, TRUCIAL COAST, OMAN AND DHOFAR, THE HADRAMAUT—Norval E. Baker, chief geologist, Iraq Petroleum Company, Ltd., and associated companies
KUWAIT—C. H. Neff, geologist, Gulf Oil Corporation
ARABIA—O. A. Seager, head of exploration department, Arabian American Oil Company
BAHREIN—James Terry Duce, vice-president, Arabian American Oil Company
IRAN—George M. Lees, chief geologist, Anglo-Iranian Oil Company, Ltd.
INDIA, PAKISTAN, BURMA—Percy Evans, chief geologist, Burmah Oil Company, Ltd.
CHINA—D. Dale Condit, staff geologist, Standard-Vacuum Oil Company
JAPAN—C. M. Pollock, scientific consultant, Natural Resources Section, General Headquarters of

Supreme Commander for the Allied Powers, through courtesy of Lt. Col. Hubert G. Schenck, chief, Natural Resources Section

PHILIPPINE ISLANDS—Grant W. Corby, consulting geologist, Philippine Oil Development Company, Inc.

BRITISH BORNEO—H. M. E. Schurmann, chief geologist, N. V. de Bataafsche Petroleum Maatschappij

NETHERLANDS EAST INDIES—George F. Barnwell, chief geologist, Standard-Vacuum Oil Company, and H. M. E. Schurmann, chief geologist, N. V. de Bataafsche Petroleum Maatschappij

PAPUA AND NORTHEAST GUINEA—J. N. Montgomery, research geologist, Australasian Petroleum Company, Pty., Ltd., Melbourne, Australia

AUSTRALIA—D. Dale Condit, staff geologist, Standard-Vacuum Oil Company, New York, and H. G. Raggatt, director, Bureau of Mineral Resources, Geology and Geophysics, Department of Supply and Development, Commonwealth of Australia

WESTERN HEMISPHERE

ALASKA

As part of the Navy's program of exploration for oil in the 35,000 square mile Naval Petroleum Reserve No. 4 the U. S. Geological Survey carried out reconnaissance and more detailed geologic mapping, laboratory and office investigations, and the preparation of planimetric base maps.

The geologic field work in N.P.R. No. 4 and adjoining areas was carried out by three parties. These arrived at the initial field stations about May 30 and completed the season's work about September 1, making a total of 9 party months of work. Party No. 1 worked as two units. The first unit traversed the Chandler River through the foothills southwest of Umiat by boat for re-study and re-sampling of this area. This area is underlain by rocks of Lower and Upper Cretaceous and Early Tertiary. The second unit of Party No. 1 studied scattered areas along the Colville River drainage. This work was carried out by the use of a small plane on floats working out of Umiat base camp. Work was concentrated on Upper Cretaceous outcrops. Party No. 2 traversed the Ketik, Avalik, and Nigiaktuvik rivers in the northwestern part of the Reserve. In addition, studies of Lisburne limestone (Mississippian age) were made in the areas of Chandler and Kurupa lakes in the Brooks Range. Party No. 3 traversed along the front of the Romanzof Mountains crossing the Okpilak and Hulahula rivers and then traversed, by boat, the Sadlerochit River to the Arctic Coast. This area is about 200 miles east of Umiat in northeastern Alaska east of the Reserve. Rocks in this area include pre-Carboniferous, Carboniferous, Permian, Triassic, Jurassic, and Cretaceous. This party was financed by the U. S. Geological Survey with logistic support supplied by the U. S. Navy, whereas parties Nos. 1 and 2 were financed out of Navy funds.

The laboratory and office investigations included core analyses, heavy mineral and other petrologic studies of sandstones, microfossil studies, macrofossil studies, aerial photography studies, and stratigraphic environmental analyses of the sediments. These studies were carried out at the headquarters in Fairbanks.

Compilation of planimetric base maps from trimetrogon and vertical photographs continues. A new program of complete vertical photo coverage of N.P.R. No. 4 was started by the U. S. Navy and is about 50% completed.

FIG. 1

Geophysical work during 1948 was carried out by United Geophysical Company, as follows. A total of 16 crew months were spent doing continuous reflection type shooting on detail and reconnaissance programs. A total of 5 crew months were spent in refraction-type shooting. The refraction program consisted of a 180-mile loop in the northwestern part of the Reserve. One month of the five

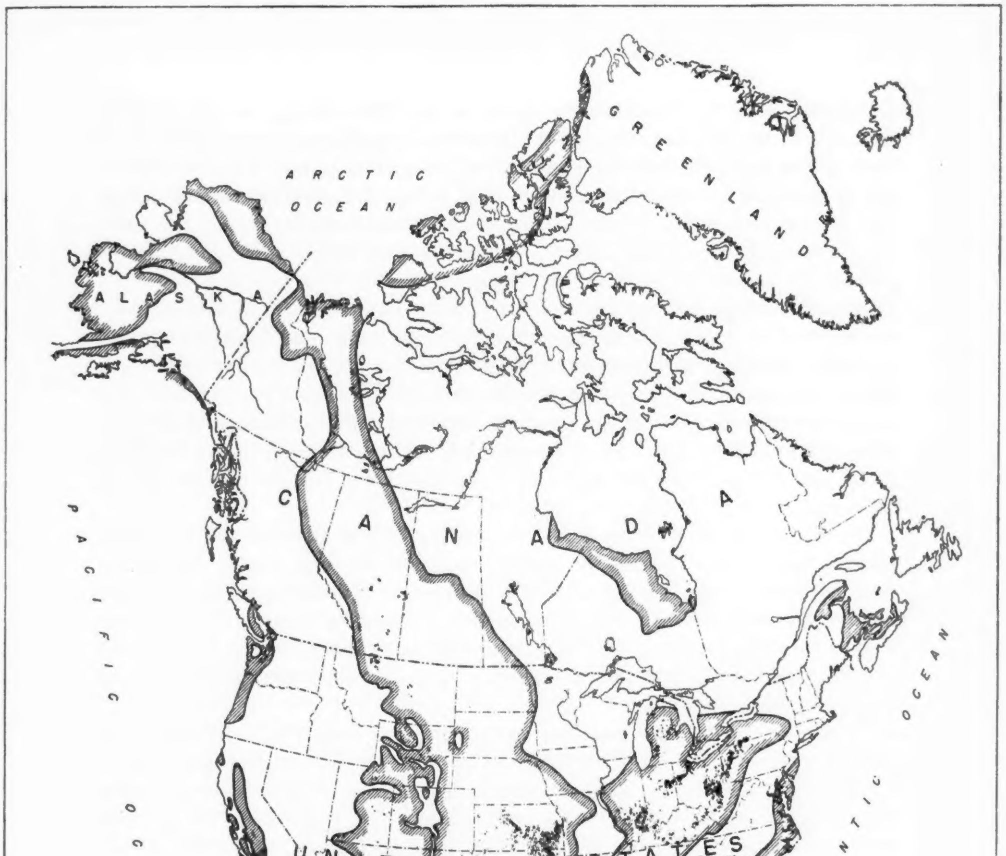

NORTH AMERICA
SEDIMENTARY BASINS
AND
OIL FIELDS
0 100 400 800
MILES
ARCTIC OCEAN
GREENLAND
ALASKA
CANADA
PACIFIC OCEAN
UNITED STATES
ATLANTIC OCEAN
GULF OF MEXICO
MEXICO
CARIBBEAN SEA
GUATEMALA
BR. HOND
HONDURAS
EL SALVADOR
NICARAGUA
COSTA RICA
PANAMA

Fig. 2

was spent trying to determine the depth to the high velocity on the Oumalik structure in the southern part of the Reserve. Approximately five weeks were spent trying to do off-shore water work along the northern coast. Adverse weather and exceptional ice conditions allowed only 2 days of actual operations during this entire period. Thirteen miles of line were shot continuously during this time. More favorable weather conditions, obtained by an earlier start, would make seismic water-work successful in the Arctic.

The general quality and continuity of seismic data obtained in working over the Reserve are good. Local areas require deeper holes and larger charges of dynamite, but these areas are very few. Average shot depth is 60 feet and charge size approximately 20–30 pounds. Results have been obtained to a depth of over 14,000 feet in some parts of the Reserve. Two weeks of experimental work were done in an effort to shoot above the ground, in order to do away with drilling shot-holes. The results of this work under the direction of Poulter were completely negative.

The extreme cold weather does not interfere with or alter results. In winter, the seismometers are planted through the snow or the frozen tundra. In summer they are planted through the thawed tundra onto the frozen ground. Since the snow is very light and the thaw very small, this planting is easily done. Permafrost or frozen ground near the surface in some parts of the Reserve gives a very high starting velocity but presents no major problem when taken into consideration in the computations.

Winter operations this year during October and November were carried on in temperatures of 40°–50° below zero. The main trouble encountered at these temperatures was freezing and breaking of the geophone cable insulation, causing shorts in the system. This has been corrected now by the use of low-temperature rubber insulation. The peak of production is reached near the middle of June when the temperature becomes warmer and just before the break-up of the ice on the lakes and melting of the snow. An average of about 5 profiles per day were shot during the 1948 season. Work can be started in the early part of the season, as soon as there is enough daylight to do the surveying.

Cape Simpson No. 1, located on a seismograph structure in the vicinity of the largest seepages on the reserve, was completed at 7,002 feet early in the year. A generalized log of the well follows:

	Depth in Feet
Late Tertiary "Gubic" formation (mastodons)	150
Early Tertiary (Eocene) and Upper Cretaceous (Base of Eocene at about 2,800 feet)	3,900
Hard black shale lithologically similar to Lower Cretaceous of Umiat region, but with scanty diagnostic fossils	6,173
(Contains a limestone pebble conglomerate at base, which may have been derived from Mississippian Lisburne limestone which crops out widely in Brooks Range south of Arctic basin)	
Slightly harder black shales and calcareous shales, possibly both Jurassic and Triassic	6,545
Steeply dipping and contorted phyllite, probably pre-Cambrian	7,002

On the west on Point Barrow, Barrow No. 1 was drilled to 3,553 feet. The well logged gray marine shales, with thin sands and with good Eocene fauna to

about 2,800 feet, hard black shales and sands of Mesozoic age to 3,450 feet, and hard phyllite similar to basement in the Simpson well to 3,553 feet. Geophysical evidence combined with that from the drilling show that a buried ancient foreland ridge or mountain exists in the Barrow area. Elevations on this ridge appear to increase south of the Barrow well until the sedimentary cover is only about 2,500 feet. Barrow No. 2 was spudded in over this ridge in December, 1948, with a Cardwell rig at a point about 5 miles southeast of Barrow No. 1. If possible, Barrow No.3 will be drilled 3–5 miles farther south in 1949. In addition to outlining the ridge, these wells will explore the section along it, which is known to contain oil-bearing sands in the Barrow-Cape Simpson area. Along with this, it is planned to drill two or three core holes to 1,200 feet or less in the area of the Cape Simpson oil seeps on the east, where structure of some sort appears to have localized the seepages and where previous coring and pitting encountered good oil showings.

In addition to the drilling in the Barrow-Cape Simpson area, two other important wildcats are scheduled for 1949. On Oumalik anticline (a huge structure with 900 feet of closure, about 120 miles west-southwest of Umiat) a newly acquired Supertitan rig will be rigged up for a 15,000-foot test. It is anticipated that a depth of 5,000–6,000 feet will be reached by November, 1949, when a decision will be made whether to continue, case, and suspend, or abandon the well. It is also planned to drill a test with a National 50 rig to a depth of 6,000 feet or less at a location just east of the Fish Creek oil seepage in the northeastern corner of the Reserve.

An expansion of U.S. Geological Survey work to about 24 party months, using six geologic field parties, is proposed for the 1949 season. Five of these parties will be paid for out of Navy funds and one from U. S. G. S. funds with logistic support provided by Arctic contractors. The geologic work will consist of stratigraphic studies and structure detail mapping. An increase in office and laboratory investigation is also planned.

A flying gravity crew will cover a large circuit in the northwestern part of the Reserve. Four seismograph crews, doing both refraction and reflection work, will operate during 1949. This study will be largely concentrated in the region around and south of Point Barrow and southward along an ancient ridge, which geophysics has indicated extends south-southeast from Barrow toward Umiat. This ridge appears to divide the Arctic plains into two separate sedimentary basins, a largely Cretaceous basin on the west and a Tertiary basin overlying Cretaceous on the east or northeast. The large seepages at Cape Simpson and that at Fish Creek are believed to have their source in the Tertiary sediments.

Canada

Oil production in Canada was at the rate of 32,500 barrels daily in 1948, to bring the cumulative production for the country to 143,200,000 barrels. About 88% of the production was from Alberta, and the remainder was from Saskatchewan, Northwest Territories (Norman Wells), Ontario, and New

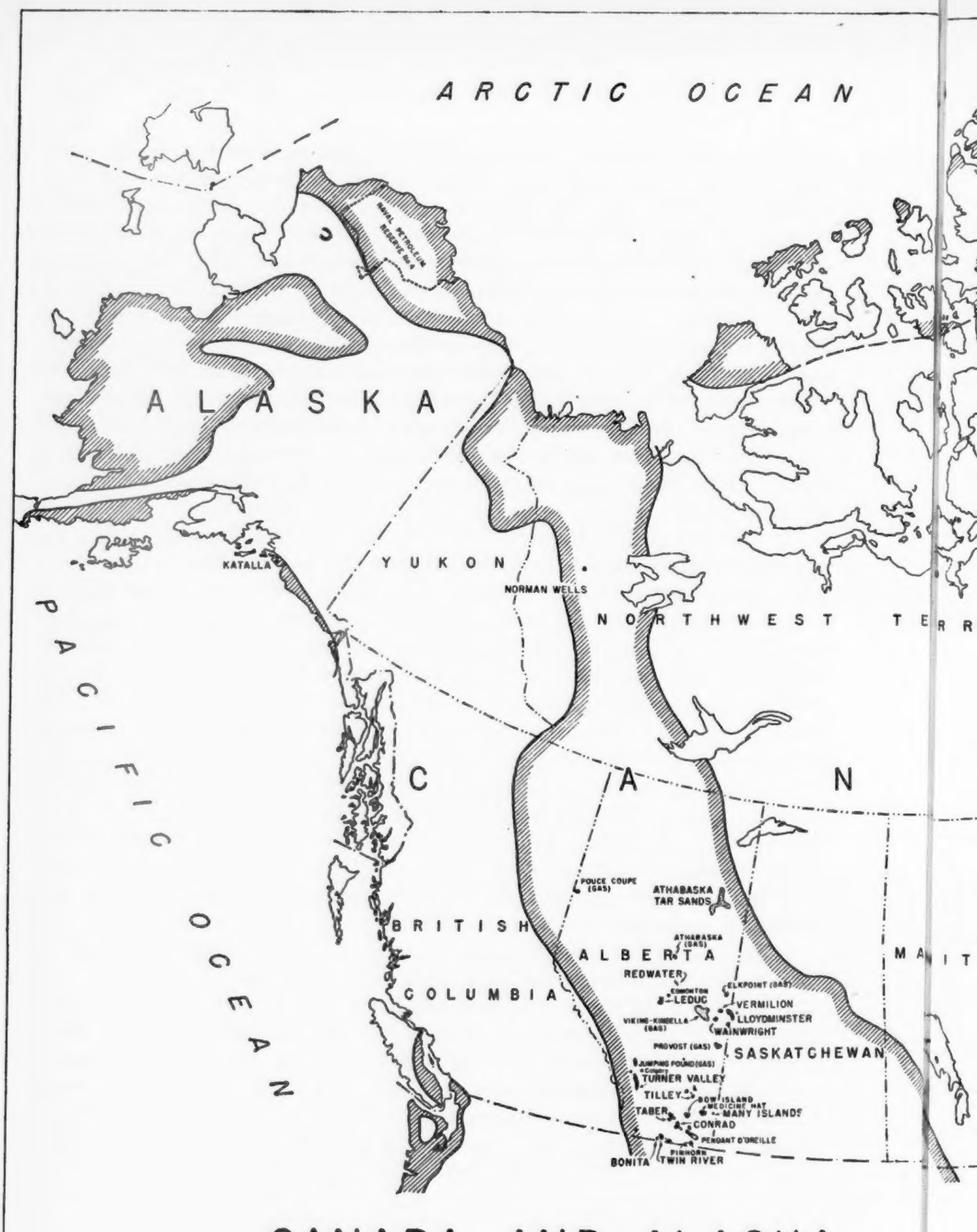


FIG. 3 (West half)

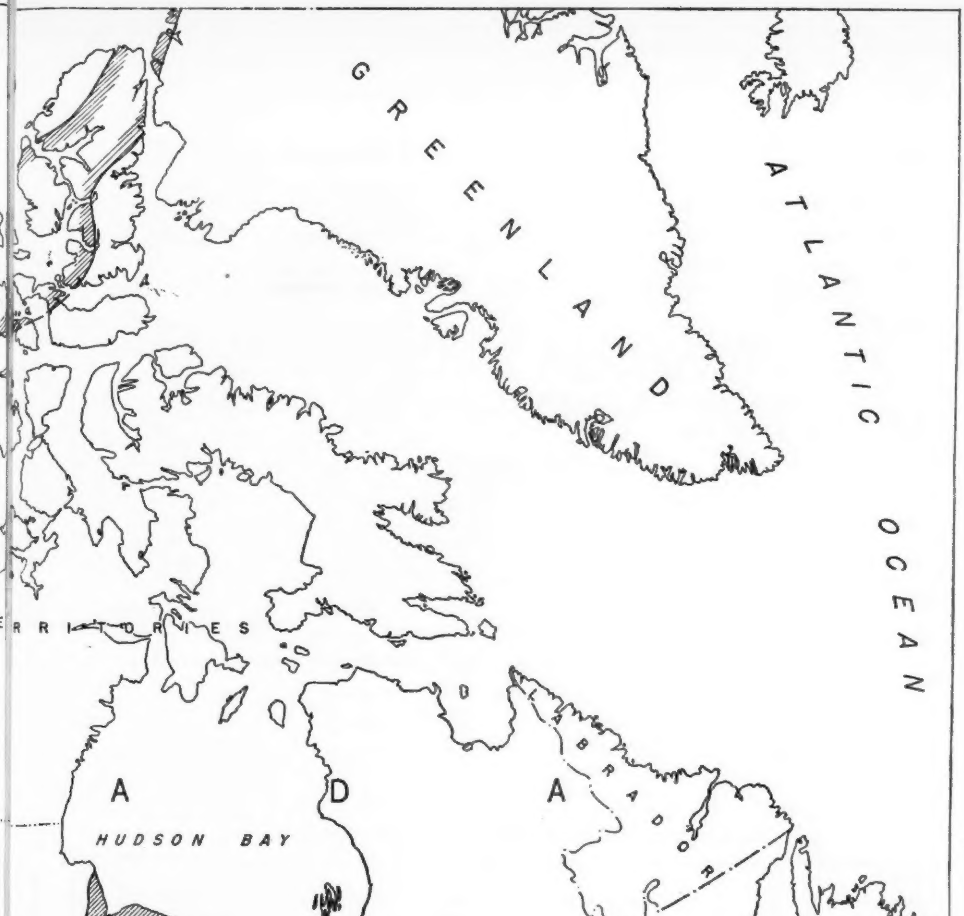


FIG. 3 (East half)

Brunswick in the order named. The highlights of oil supply and demand are as follows.

a. An increase in the Prairie Provinces' crude requirement of 20% over 1947.

b. Increase of 11,000 barrels daily in Prairie refining capacity bringing the total capacity to 49,000 barrels daily.

c. Oil production was at an all time high showing an increase of 62.5% over the previous year.

d. Oil production at the end of the year was over 40,000 b/d and with indications that the Prairie refining capacity would be met by April 1, 1949.

The following table shows the estimated distribution of geophysical and geological work during 1947.

PARTY MONTHS

	Western Canada		*Eastern Canada*		*Total*	
	Total	*Average*	*Total*	*Average*	*Total*	*Average*
Geological						
Field geology	54	4.5	32	2.66	86	7.16
Core drilling	59½	4.95	—	—	59½	4.95
	113½	9.45	32	2.66	145½	12.11
Geophysical						
Seismic	375	31.3	6	.5	381	31.8
Gravity	109	9.1	—	—	109	9.1
Magnetometer	8	.7	—	—	8	.7
	492	41.1	6	.5	498	41.6

INDUSTRY'S GEOPHYSICAL ACTIVITIES, WESTERN CANADA, 1948

Alberta				
Month	*Seismograph*	*Gravity*	*Magnetometer*	*Total*
January	17	5	1	23
February	19	5	1	25
March	26	8	1	35
April	28	7	1	36
May	34	7	—	41
June	36	10	1	47
July and August	40	9	1	50
September	42	12	1	55
October	43	13	1	57
November	43	14	—	57
December	45	14	—	59
	373	104	8	485
Saskatchewan				
October	1	2	—	3
November	1	2	—	3
December	—	1	—	1
	2	5	—	7

The geophysical work showed a three-fold increase during the year, from 23 crews in January to 61 crews in December; of these, 45 were on seismic operations.

There was a general northward movement in the exploration with a concentration of work in the area northeast of Edmonton, brought about by the Redwater discovery. The Grande Prairie district received considerable attention with an increase in seismic work and the spudding of three wildcat wells.

At the end of the year in Alberta, it is estimated that 50,000,000 acres were held under lease and reservation, of which approximately 35,000,000 acres were composed of Crown holdings, and the balance of private lands. In addition more than 5,000,000 acres of Crown lands in Saskatchewan were held under lease and reservation.

The highlights of the 1948 exploration results in Western Canada are as follows.

a. Discovery of a major field, 30 miles northeast of Edmonton, in reef dolomite of Devonian age at a depth of 3,110 feet. The pay zone of 35° A.P.I. oil is 140 feet thick in the discovery well, Imperial Redwater No. 1. This well flowed initially after acid treatment at the rate of 1,728 barrels daily. The field was discovered in September and by the end of December was proved over a length of 9 miles and a width of 2 miles by 4 outpost wells. Redwater is believed to be a larger field than Leduc because of the thick D-3 pay zone. It is probably the major discovery in the Western Hemisphere during 1948.

b. A new pool was discovered in January, 3 miles north of the Leduc producing area. This pool, named Woodbend, has so far not been found to connect with Leduc. The discovery well, Imperial Woodbend No. 1, encountered the D-3 pay zone of the Devonian at 5,228 feet. Initial flowing production of 39° A.P.I. oil was at the rate of 2,232 barrels daily. A total of 10 producers and 1 dry hole were drilled by the end of the year. Some oil and gas showings were encountered in higher zones of the Devonian which may eventually be proved productive at other locations.

c. Important extensions were made to the Leduc pool. A new pool, 1½ miles south of the Leduc producers, was discovered by Okalta Leduc No. 2. It found flowing production in both the D-2 and D-3 zones. This pool appears to be disconnected from the main field.

d. An important wet gas discovery was made during January, 1948, by Gulf's Pincher Creek No. 1. The discovery well was located on the basis of a refraction seismic survey which was carried out by Gulf over a 2-year period. The production comes from a pay zone in the Madison limestone from 11,755–11,927 feet. The well is capable of producing about 25,000 MCF/D of wet gas on open flow. On restricted choke, it flowed 9,200 MCF/D gas from which was recovered 328 barrels of naphtha in a 24-hour run. The bottom-hole pressure was measured at approximately 5,880 psi. A second and third well on the structure were drilling at the end of the year.

e. Socony Craigmyle No. 1, a few miles northeast of Hanna, tested a porous zone in the Madison limestone from 4,024–4,076 feet to flow 34° A.P.I. oil to the surface in 18 minutes. The drill pipe contained 1,080 feet of oil when pulled. The full potentialities of this discovery are not yet known as the well was deepened

in search of oil in the older Paleozoic beds. The well was drilling below 5,100 feet on December 31.

f. Hanna Petroleum's No. 3 discovered 32° A.P.I. gravity oil in a 5-foot porous sand at the base of the Lower Cretaceous. The well produced initially at the rate of 360 barrels daily through ½-inch choke.

g. Gas, in commercial quantities, was discovered in a number of wells, namely, California Standard Brooks Province 36-14-19, Manville No. 1, Hanna Petroleum's Dowling No. 1, California Dunmore Province 65-5-11, Peace River Natural Gas Alberta No. 2, Imperial Morinville No. 2, Imperial Legal No. 2, and Pacific Sunray Halfway Lake No. 1.

h. Royalite No. 73 rates as a deeper pool discovery, having found commercial production in a lower fault block which underlies the main Turner Valley Lime block. The well was deepened from 6,271 feet to 8,413 to recover 354 barrels of 40° gravity oil from 3 porous zones. On a $\frac{9}{32}$-inch choke, the well produced 146 barrels daily with a gas-oil ratio of 3,822 CF/B.

i. Central Leduc No. 3, a new pool discovery, found commercial production of 37° A.P.I. oil in the Lower Cretaceous from a depth of 4,211 feet. The well produced initially at the rate of 672 barrels daily through a ⅜-inch choke.

In Eastern Canada, exploration was mainly concentrated in southwestern Ontario. The following are the highlights of the 1948 drilling.

a. Union Imperial Electric No. 1 discovered a small gas field 5 miles due south of Wallaceburg. Production was at the rate of 600 MCF/D from the Mount Simon formation of Cambrian age.

b. A small oil field was discovered by Imperial Dante No. 2 at a depth of 345 feet in the Devonian. The initial well made 45 barrels daily.

c. Imperial and Continental Petroleum's No. 1 on the Gaspé Peninsula, Quebec, was drilled to 6,360 feet and abandoned as a dry hole.

d. The Becher oil and gas field and the Kimball gas field, both in the vicinity of Wallaceburg, Ontario, were extended during the year by step-out drilling.

Exploration wells drilled during 1948 in Canada are divided approximately as follows.

	New-Field Wildcats	*Outposts*	*New-Pool Wildcats*	*Deeper-Pool Tests*	*Development Wells*
Western Canada					
Alberta	114	25	8	2	206
Saskatchewan	16	—	—	—	54
Manitoba	—	—	—	—	—
	130	25	8	2	260
Eastern Canada					
Ontario	62	—	—	3	285
St. Lawrence Lowland	1	—	—	—	—
New Brunswick	3	—	—	—	—
Gaspe	3	—	—	—	—
	69	—	—	3	285
Grand total	199	25	8	5	545

Development drilling was at an all-time high during 1948 with a preponderance of drilling in the Leduc field. The following is a tabulation of the number of wells at Leduc and Redwater by the end of the year.

	Dry	*Gas*	*Oil*	*Drilling*
Leduc	33	1	178	33
Redwater	1	—	3	6

In Eastern Canada development drilling accounted for an estimated 285 wells.

At the close of the year, approximately 50 exploratory wells were testing, drilling or rigging in Alberta and Saskatchewan, 3 in Ontario, 2 in Quebec, and 1 in New Brunswick. At the same time, 43 development wells were testing, drilling or rigging.

During the year, important changes were made in the Alberta legislation pertaining to the exploration of oil and gas on Crown lands. Further restrictions were placed on the shape and size of lease blocks comprising the leasable 50% of the Crown lands in reservations. There was a reduction of the area of leases validated by one well. Where a discovery is made, lease blocks must be applied for within 3 months, and, during that period, no additional drilling may take place on Crown lands within 4½ miles of the discovery well.

A Natural Gas Commission was set up in Alberta to inquire into the possible export of gas from the province. This body was holding hearings at the end of the year.

Mexico

At the end of 1948, cumulative oil production in Mexico totaled about 2,370,000,000 barrels. Production for 1948, estimated on the basis of the first 11 months, will total about 58,600,000 barrels from the following areas.

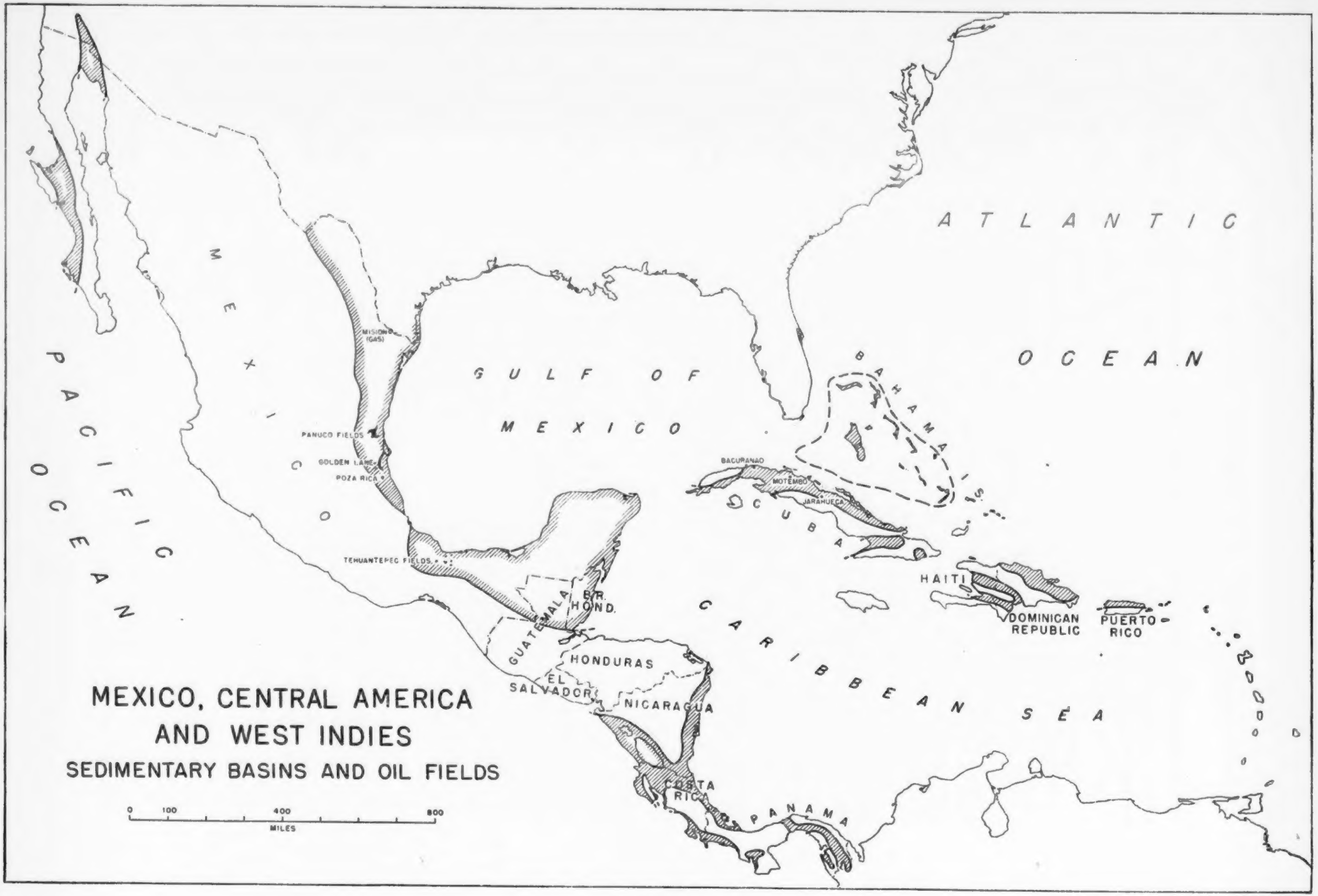
	Total	*Barrels Daily*
Northern district (Panuco field)	10,000,000	27,300
Southern district (Golden Lane)	7,700,000	21,000
Poza Rica	34,600,000	94,500
Isthmus area	6,300,000	17,200
	58,600,000	160,000

Production in 1948 was 4.7% over 1947, the slight decline in the three old-producing areas being offset by an 8.5% increase in Poza Rica—which would indicate that the old fields have been produced close to their maximum during the past 2 years.

The following table shows the extent of geological and geophysical activity in 1948.

	Geologic	*Seismic*	*Gravity*	*Electric*
Crew or party months	146	160	47	12
Average number	12.6	13.3	3.9	1.0

The increased exploratory efforts by Pemex are reflected by the increase of 30% in 1948 over 1947 in the total crew or party months.


MEXICO, CENTRAL AMERICA
AND WEST INDIES
SEDIMENTARY BASINS AND OIL FIELDS
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MILES
ATLANTIC
OCEAN
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GULF OF
MEXICO
MEXICO
CARIBBEAN SEA
MISION (GAS)
PANUCO FIELDS
GOLDEN LANE
POZA RICA
TEHUANTEPEC FIELDS
BAHAMA IS.
BACURANAO
MOTEMBO
JARAHUECA
CUBA
HAITI
DOMINICAN
REPUBLIC
PUERTO
RICO
BR.
HOND.
GUATEMALA
HONDURAS
EL
SALVADOR
NICARAGUA
COSTA
RICA
PANAMA

Fig. 4

Eighty-two wells were completed in Mexico during 1948—an increase of 60% in drilling activities over the previous year. Twenty-four wells may be classed as exploratory and 58 as exploitation wells. The 58 exploitation wells were drilled in the following areas.

	Producer	*Failure*	*Total*
Northeastern Mexico	3	1	4
Northern District	6	4	10
Southern District	8	6	14
Poza Rica Area	10	3	13
Isthmus	10	7	17
	—	—	—
	37	21	58

The 24 exploratory wells were drilled over a wide area. Eight of these wells, including 1 well in Chihuahua, were drilled in northern or northeastern Mexico, 9 in the Tampico Embayment, and 7 in the Isthmus area. Geophysics played an increasingly important part in the selection of locations, although it is evident from the figures that extensive geological studies continue.

There were four new developments during the year. Although it is still too early to estimate their full significance, the following data are of interest.

Five producers have been brought in in the "Moralillo" field, 5 miles west of the prolific "Cerro Azul" hacienda on the old Golden Lane of Mexico. This area may be expected to be producing about 2,000 b/d during 1949 but the ultimate recovery of the wells is still very much open to question.

A discovery well was completed in a new field in the Saline Basin of the Isthmus, close to the Minatitlan refinery in that area. Of a shallow depth of about 2,100 feet, development wells are expected to have a comparatively small daily capacity of about 150 b/d and the extent of the discovery must wait on future operations.

In northeastern Mexico, the "Mision" gas field a few miles west of Reynosa, which was actually discovered in 1946, has been connected with the gas line to Monterrey and its importance may be estimated by the production during November, 1948, of 316,500 MCF from the 3 wells being produced.

Six producers have been completed in a newly discovered field in lensing Tertiary sands, just south of the town of Reynosa. Lack of transportation facilities prevent any full estimate of the capacity of these wells at this time but the present wells may be considered good for about 2,000 b/d during 1949. A full development program is planned for this area by Pemex and there may be excellent possibilities for the future.

At the end of 1948, 40 wells were being drilled in Mexico, as follows: in northeastern Mexico, 4 exploratory and 3 exploitation wells (in the Reynosa field); in the northern district, 1 exploratory and 5 exploitation wells; in the southern district (including the area south of Poza Rica), 5 exploratory and 4 exploitation wells (3 of which are in the "Moralillo" area); in Poza Rica, 4 exploitation wells; and in the Isthmus, 3 exploratory and 11 exploitation wells (2 of which are in the new Moloacan field).

The following table gives the break-down of wells completed in Mexico by area, for the year 1948, total completions from the beginning through 1948, and wells completed by the Government's Pemex since the expropriation of March 18, 1938.

SUMMARY OF COMPLETED WELLS IN MEXICO

	Wells Completed during 1948			*Total Wells Completed in Mexico*			*Total Wells drilled by Pemex*		
	Prod.	*Fail.*	*Total*	*Prod.*	*Fail.*	*Total*	*Prod.*	*Fail.*	*Total*
1. Lower California	—	—	—	—	3	3	—	—	—
2. Chihuahua	—	1	1	—	6	6	—	2	2
3. Coahuila	—	—	—	—	22	22	—	—	—
4. Nuevo Leon	—	—	—	1	25	26	—	2	2
5. Northern Tamaulipas	6	5	11	31	35	66	12	9	21
6. Central Tamaulipas	—	—	—	—	12	12	—	—	—
Sub-total	6	6	12	32	103	135	12	13	25
7. *Northern Fields*									
a. Southern Tamaulipas	—	—	—	17	158	175	—	—	—
b. Tampico-Panuco area	6	5	11	1,622	2,629	4,251	25	66	91
Sub-total	6	5	11	1,639	2,787	4,426	25	66	91
8. *Southern District*									
a. Ozulama-Tantoyuca area	—	—	—	3	49	52	—	—	—
b. Temporal area	—	—	—	—	24	24	—	—	—
c. East flank	—	—	—	38	104	142	—	2	2
d. Western group	5	9	14	7	33	40	6	16	22
e. Tlacolula-Metlaltoyuca	—	1	1	2	19	21	1	3	4
f. Main Belt (Golden Lane)	3	3	6	530	534	1,064	3	8	11
Sub-total	8	13	21	580	763	1,343	10	29	39
9. *Poza Rica Area*									
a. Poza Rica-San Miguel Mec	9	4	13	92	18	110	68	11	79
b. Furbero-Papantla	—	—	—	16	62	78	—	—	—
10. Veracruz Embayment	—	1	1	—	4	4	—	1	1
11. *Isthmus of Tehuantepec*									
a. Saline Basin	13	8	21	415	309	724	85	43	128
b. Tabasco	1	2	3	9	34	43	1	11	12
c. Chiapas	—	—	—	5	19	24	—	—	—
Sub-total	14	10	24	429	362	791	86	54	140
12. Oaxaca	—	—	—	—	6	6	—	—	—
13. Yucatan	—	—	—	—	6	6	—	—	—
14. Valley of Mexico	—	—	—	—	8	8	—	—	—
Totals	43	39	82	2,788	4,119	6,907	201	174	375

The petroleum industry of Mexico continues to be a Government monopoly and there have been no outside leasing activities. Even the trading in pre-constitutional concessions issued under the 1926 Petroleum Law has abated as there is some question as to the legality of such deals.

A few United States oil companies continue to confer with Pemex in an effort to find some workable participation agreement but nothing concrete appears to have come of these efforts to date. According to the Wolverton Committee report on the Mexican petroleum situation, there is some possible doubt if Pemex "... can legally enter into long-term contracts which entitle foreign companies to a percentage of oil produced from wells drilled by them, and which give the companies a degree of managerial control sufficient to protect their investments in their exploration and exploitation ventures. ..."

A tentative estimate of existing petroleum reserves in Mexico may be set up as follows.

Northeastern Mexico	10,000,000	(new Reynosa field)
Northern District	60,000,000	
Southern District	70,000,000	
Poza Rica	800,000,000	
Isthmus	55,000,000	
	1,005,000,000	

Total petroleum supplies for Mexico during 1948 consisted of 160,000 b/d of crude production plus 13,000 b/d of crude and products imported from the United States. Domestic consumption in Mexico in 1948 showed an increase of 8.2% over 1947 and reached 140,000 b/d, while exports amounted to 33,000 b/d.

Unless some further new fields are discovered during the coming year, production can hardly be expected to exceed 1948's 160,000 b/d and, if imports remain at the same level of 13,000 b/d, the expected increase of another 8.5% in domestic consumption will require curtailing exports to some 21,500 b/d.

Plans for increased exploratory efforts are being made by Pemex as it is realized that the relation between production and domestic demand is far from satisfactory. A new refinery at Salamanca, near Guadalajara, is now under construction and it is hoped will be operating at 30,000 b/d in the early months of 1950.

Guatemala

Three companies were engaged in exploratory work in Guatemala in 1948. Standard of Ohio conducted gravity-meter surveys of an 800,000-hectare exploration concession during the whole year. Atlantic began a gravity-meter survey in December, and also had two surface geological crews active for most of the year. The Ohio Oil Company also had a group of surface geologists in the field. Most of these efforts are in the Peten lowlands of northern Guatemala. No drilling is presently planned, though at year's end Sohio was reported endeavoring to come to terms with the Government on a direct exploitation contract which would include the right to drill. Exploratory work for all companies totaled 13 gravity-meter crew months and 20 geologic party months.

Nicaragua

The American International Fuel and Petroleum Company, a subsidiary of Gulf, jointly with Atlantic, completed a second test in the Caribbean coastal area, Twara No. 1, in March, 1948. It was abandoned at 6,267 feet. The well was located 35 kilometers northeast of Puerto Cabezas in Twara Lagoon. A previous dry test, Punta Gorda No. 1, was located 8 kilometers northeast of the Twara well.

Seismic exploration, continued from the preceding year, was suspended in May, and the party transferred out of the country. Geological work was likewise suspended. A total of 4 geologic and 5 seismic crew months of work was done during 1948.

PANAMA

The Sinclair Panama Oil Company, jointly owned by Venezuelan Petroleum and Cities Service completed its first test well on Colon Island, Bocas del Toro Province, on the northwest Caribbean coast. It was abandoned below 8,000 feet, after heaving shale was encountered. The equipment was being moved at year's end to the Pacific side, onto a location near Puerto Armuelles. Geological surveys are being forwarded in various parts of the country with emphasis on the Darien area. Surface geological work to the extent of 12 party months was done during the year.

BAHAMAS

Six companies have been active in the Bahamas: British Bahamian Oil Development (Trinidad Leaseholds); Shell Company of Bahamas; Bahamas Exploration Company, Ltd. (Gulf); Bahamas Oil Company (Superior); Anglo-Bahamian Petroleum Company, Ltd. (Anglo-Iranian); and Standard Oil Company (Bahamas) Ltd. (Standard Oil Company (N.J.)). The exploration licenses for the most of these companies expired in late 1948 or early 1949. It is believed that all of them except Shell have applied for an extension covering 1949. No drilling whatever took place during 1948.

Of these companies, the Shell, Anglo, Gulf, Standard, and Superior participated in 7 months aerial magnetic survey flown by Aero Service of Philadelphia. The field work was completed, November 25, 1947, and the final report turned in by Aero during the summer of 1948.

As most of the offices were shut down in the Bahamas during 1948, it is difficult to say exactly how much exploratory work was done. Standard did one month's seismic work and 2 months' gravity work in the winter of 1948. Anglo-Bahamian did 1 month of gravity work, and B.B.O.D. 2 months. Records show that B.B.O.D. also carried on 4 months of seismic work. B.B.O.D. apparently finished this work the third week in May. Gulf is reported to have done 2 months' seismic work which is understood to have been of an experimental nature.

Total exploration expenditure for all of these operators in the Bahamas since 1944 may be estimated at somewhat over 5 million dollars. There were several meetings of the operators in May and June, 1948, when there was serious discussion of a proposal to drill a joint test on the best available prospect in the area. Nothing further has materialized along this line.

CUBA

Drilling in Cuba during 1948 was limited to shallow wells for production from serpentine. Such operations were conducted in the following areas.

Motembo and Jarahueca, Las Villas Province
Bacuranao, Habana Province

The Cuban Gulf Oil Company carried out exploration work as follows.

	Party Months
Field geology	12
Airborne magnetometer	1
Gravimeter	8
Seismograph	6½

Production in Cuba was at the rate of about 300 barrels daily from two areas, the old Motembo and the more recently developed Jarahueca fields, both of which produce from serpentine. This constitutes a considerable decline from 1947. Cumulative production is about 712,000 barrels.

Trinidad

Production of oil from the island of Trinidad totaled about 20,188,000 barrels in 1948, an average of approximately 55,160 barrels daily, as compared with about 56,000 barrels per day in 1947. Cumulative production totals about 368,986,000 barrels.

Though there has been a marked trend toward deeper Tertiary exploration and development in recent years, most of the oil is still coming from the Miocene. It was recently reported that Trinidad Petroleum Development Company is proceeding with plans to drill a number of wells in the Moruga area to greater depths than heretofore reached on the island. Deepest horizon reached by any well drilled to date is believed to be the topmost Cretaceous. Such a well was drilled in the Pitch Lake area in 1948.

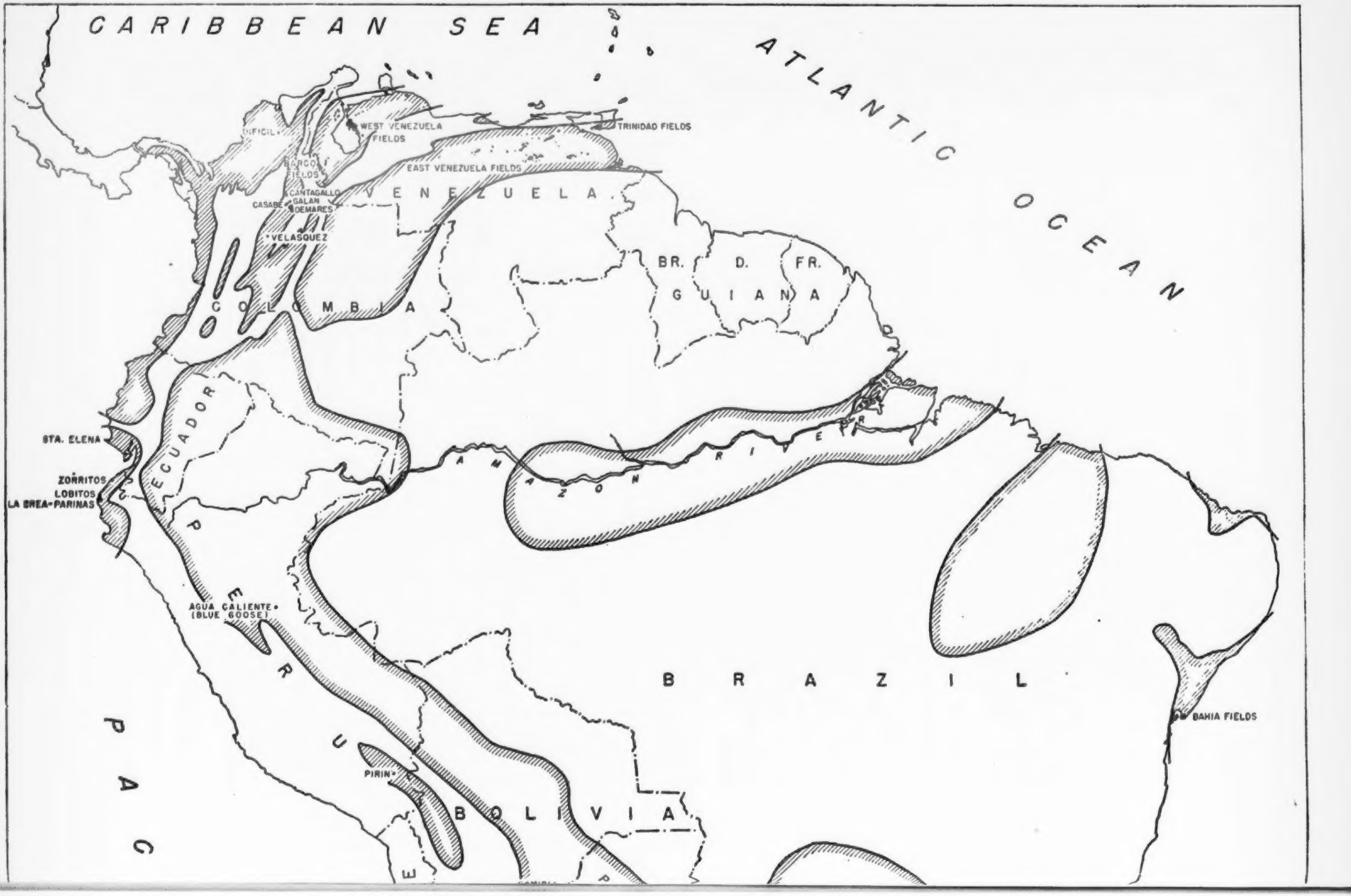
Published figures indicate a slight decrease in total footage drilled in 1948 as compared with the 644,687 feet recorded for 1947. Difficulty in obtaining equipment is still holding up exploratory drilling to some extent. In the latter part of 1948 it was reported that an estimated $5,000,000 will be spent in exploratory drilling over the next two years and an equal amount will be spent in the purchase of needed new equipment, the acquisition of which has been facilitated by increased steel allocations by the British Government.

During 1948 a total of about 60 party months of geologic and 24 crew months of gravity work were done in Trinidad. Part of the gravity studies were carried out in the Gulf of Paria by Trinidad Northern Areas Ltd. (Shell). Most of the prospective area of this gulf, which separates the Trinidad basin areas from the eastern Venezuelan mainland and basin, has already been surveyed. As reported last year, operations in the water area have been held up awaiting Government decision on royalty and other conditions for granting licenses to the various applicants. Recent reports indicate that issuance of the promised licenses for drilling is still being delayed.

Published reports give a figure of 250 million barrels as the approximate measure of Trinidad crude-oil reserves.

Venezuela

Crude-oil production in Venezuela during 1948 averaged 1,338,759 barrels per day, or an increase of more than 12% over the previous year. Cumulative


CARIBBEAN SEA
ATLANTIC OCEAN
INFICIL
WEST VENEZUELA FIELDS
TRINIDAD FIELDS
BARCO FIELDS
EAST VENEZUELA FIELDS
CANTAGALLO
CASABE
GALAN
DEMARES
VENEZUELA
VELASQUEZ
BR.
D.
FR.
GUIANA
COLOMBIA
ECUADOR
STA. ELENA
ZORRITOS
LOBITOS
LA BREA-PARINAS
AMAZON RIVER
PERU
AGUA CALIENTE (BLUE GOOSE)
BRAZIL
BAHIA FIELDS
PIRIN
BOLIVIA
PAC

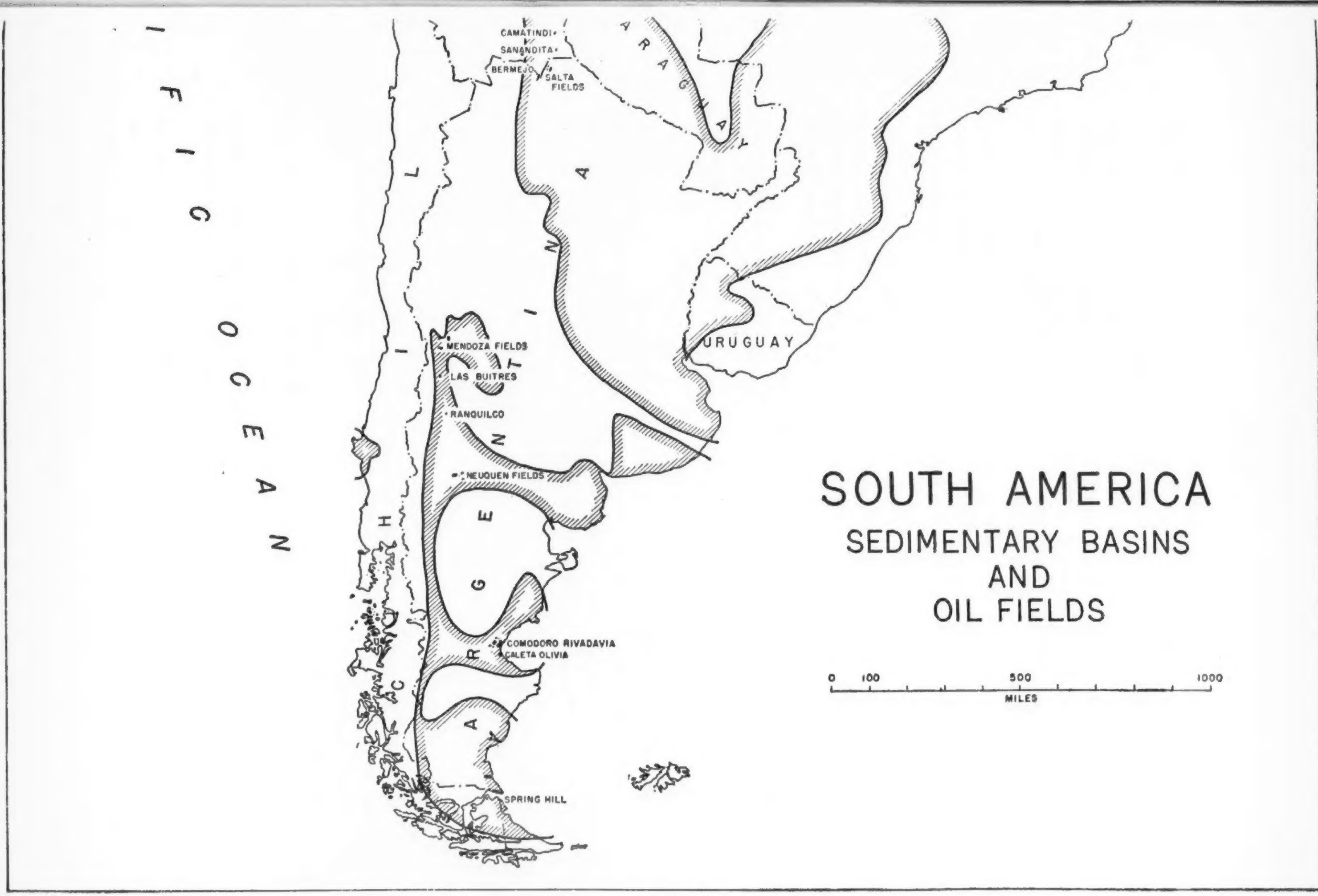

SOUTH AMERICA
SEDIMENTARY BASINS
AND
OIL FIELDS
0 100 500 1000
MILES
CAMATINDI
SANANDITA
BERMEJO
SALTA FIELDS
PARAGUAY
URUGUAY
MENDOZA FIELDS
LAS BUITRES
RANQUILCO
NEUQUEN FIELDS
COMODORO RIVADAVIA
CALETA OLIVIA
SPRING HILL
OCEAN

Fig. 5

production at the year's end totaled about $4\frac{1}{2}$ billion barrels. There is evidence that the year 1949 will not see such a rapid production rise, as there has been some curtailment of exploration and drilling activities.

The Bolivar Coastal field continued to lead with a daily average production of 727,000 barrels per day. The most rapid development occurred in the La Paz and Mara Cretaceous limestone fields of Western Venezuela, where average production increased to 119,400 and 42,600 barrels per day, respectively; or 60% and 70% more than their daily averages for 1947.

Richmond (Standard Oil Company of California) began intensive development of their Raban field, southwest of Maracaibo and a pipeline outlet was recently completed to the lake. A few thousand barrels per day of heavy crude are being produced.

With completion of the Texas Las Mercedes-Puerto La Cruz pipeline in Eastern Venezuela, the Las Mercedes and Tucupido fields entered the picture and are now producing at the rate of approximately 14,000 and 8,000 barrels per day, respectively. Substantial increases in potential were registered in the Quiriquire and Nipa fields, also in Eastern Venezuela.

Industry-wide geological and geophysical activity during 1948 is tabulated as follows.

	Seismic	*Gravity*	*Magnetic*	*Surface Geology*	*Structure Drill*
Total party months	285.3	101.7	1.2	235.6	47.3

The accompanying table gives the breakdown of industry well completions for 1948 according to the Lahee classification. On comparing with 1947, it is seen that drilling operations increased during 1948, with 886 completions as against 787 during 1947. This activity may be summarized as follows.

WELL COMPLETIONS DURING 1948

	Exploitation	*Exploration*	*Total*
Oil	771	17	788
Gas	5	3	8
Dry	51	39	90
Total	827	59	886

Thirty-six exploration wells were drilling at the year's end. At least seven of these are deep new-field wildcats in Western Venezuela, with Cretaceous limestone as their objective.

Discoveries of outstanding importance were as follows.

1. Discovery by Shell of deep Cretaceous limestone production in the old Concepcion field, west of Maracaibo.

2. Discovery of Cretaceous limestone production by Shell's Sibucara No. 5 at a depth below 12,200 feet. This new field discovery is located in the outskirts of the city of Maracaibo.

3. Confirmation of Socony's San Silvestre No. 2 discovery in the State of Barinas, a few kilometers south of the town of Barinas. This opens up a new petroliferous province in Venezuela.

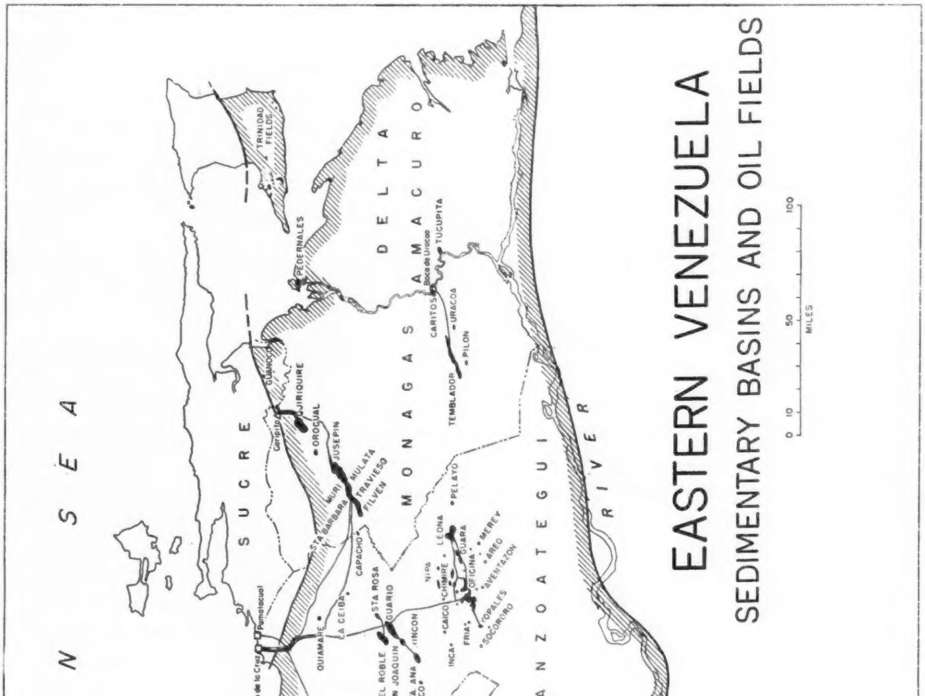

EASTERN VENEZUELA
SEDIMENTARY BASINS AND OIL FIELDS
CARIBBEAN SEA
SUCRE
MONAGAS
ANZOATEGUI
GUARICO
MIRANDA
APURE
DELTA AMACURO
ORINOCO
RIVER
TRINIDAD FIELDS
PEDERNALES
TUCUPITA
CARITOS
URACOA
PILON
TEMBLADOR
GUANOCO
QUIRIQUINE
OROCUAL
JUSEPIN
MULATA
TRAVIESO
FILVEN
MURI
STA BARBARA
CAPACHO
STA ROSA
GUARIO
LA CEIBA
QUIAMARE
EL ROBLE
SAN JOAQUIN
STA ANA
TOCO
RINCON
LAS OLLAS
TUCUPIDO
SABAN
PALACIO
MERCEDES
GUAVANITA
PELAYO
LEONA
GUARA
MEREY
AREO
AVENTAZON
OFICINA
CHIMIRE
NIPA
CAICO
INCA
FRIA
TOPALES
SOCORORO
Puerto de la Cruz
Caracas
MILES
0 10 50 100

FIG. 6

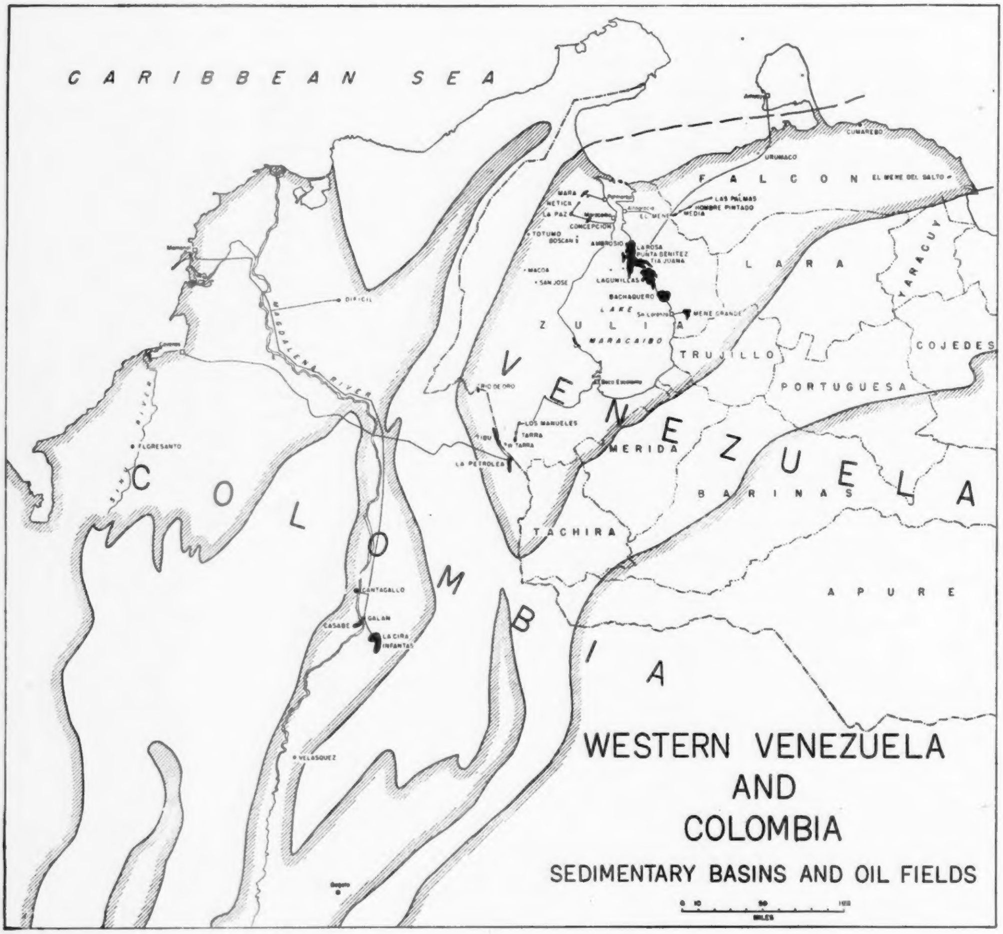

CARIBBEAN SEA
WESTERN VENEZUELA
AND
COLOMBIA
SEDIMENTARY BASINS AND OIL FIELDS
MILES
COLOMBIA
VENEZUELA
MAGDALENA RIVER
DIFICIL
FLORESANTO
CANTAGALLO
GALAN
CASABE
LA CIRA
INFANTAS
VELASQUEZ
RIO DE ORO
LOS MANUELES
TARRA
TIBU
W TARRA
LA PETROLEA
FALCON
URUMACO
CUMAREBO
EL MENE DEL SALTO
LAS PALMAS
HOMBRE PINTADO
MEDIA
EL MENE
MARA
NETICK
LA PAZ
CONCEPCION
TOTUMO
BOSCAN
AMBROSIO
LA ROSA
PUNTA BENITEZ
TIA JUANA
MACOA
SAN JOSE
LAGUNILLAS
BACHAQUERO
LAKE
MARACAIBO
MENE GRANDE
ZULIA
LARA
YARACUY
COJEDES
TRUJILLO
PORTUGUESA
MERIDA
BARINAS
TACHIRA
APURE

FIG. 7

4. Discovery by Creole of Oligocene production in the Quiriquire field. The importance of this new development can not yet be evaluated.

5. Creole's JX-6 new-field discovery north of the Jusepin field.

6. A number of new-field discoveries in the Greater Oficina area by Meneg.

7. Important extensions in the proved area of Creole's part of the Bolivar Coastal fields both in Miocene and Eocene reservoirs.

As may be seen from this summary, the trend toward deeper wildcatting continues. It should be noted that Shell's Sibucara discovery uncovered one of the world's deepest oil fields.

The Venezuelan Government granted no new concessions during 1948. Changes during the year were as follows.

	Dec. 31, 1947	*Dec. 31, 1948*
Total hectares covered by exploitation concessions	5,639,627	6,784,842
Total hectares covered by exploration concessions	5,080,468	1,486,228

It should be borne in mind that not more than 50% of the exploration acreage may be retained for exploitation purposes. As may be seen from the tabulation, large blocks of exploration concessions were parceled during 1948, decreasing the exploration holdings and increasing the exploitation holdings. Some 166,515 hectares of exploitation concessions were renounced during the year in the states of Apure, Barinas, Guarico, Aragua, and Monagas.

Refinery runs in Venezuela totaled 43,146,000 barrels during 1948, an increase of 7,295,000 barrels over 1947. Construction of large refineries on the Paraguana peninsula was continued by Shell and Creole. In December, Creole completed a pipeline from the Bolivar Coastal field to its Amuay terminal, on the Paraguana peninsula, and is now pumping 200,000 barrels per day of crude through this new line. When the intermediate Dabajuro pump station goes into the line, in March or April, 1949, this volume may be increased to more than 300,000 barrels per day.

Colombia

In 1948, Colombia produced 23,745,100 barrels of crude petroleum (64,877 barrels daily) and 578,797 barrels of condensate. This compares with a crude-oil and condensate production of 25,881,322 barrels in 1947 or a decrease of 6.02%. The production by fields is shown in the following table.

By companies the production was as follows: Tropical Oil Company, 9,094,225 barrels of crude and 578,797 barrels of condensate from its four fields in the De Mares concession; Colombian Petroleum Company, 7,994,389 barrels of crude from its fields in the Barco concession; Shell Oil Company, 6,223,847 barrels of crude from its two fields in the Yondo and El Dificil concessions; Socony-Vacuum, 385,170 barrels of crude from its Cantagallo concession; and Texas Petroleum Company, 47,469 barrels of crude from its Velasquez private lease. Cumulative production in Colombia totals about 436,920,000 barrels.

Exploitation drilling by the industry during 1948 reflects a marked decline

Production by Fields, 1948

Field	Producing Formation: Name and Age	Year of Discovery	Area Proved Acres	Oil Production, Barrels: To End of 1948	Oil Production, Barrels: During 1948	Number of Wells: Completed to End of 1948	Number of Wells, 1948: Completed	Number of Wells, 1948: Abandoned
Cantagallo	La Paz, Eocene	1943	500	548,862	385,170	12	—	—
Carbonera	Barco and Los Cuervos, Eocene	1938	500	151,154	7,013	3	0	1
Casabe	Colorado, Oligocene	1941	—	15,448,229	5,682,644	99	28	—
Colorado	C-Zone, Eocene	1932	270	250,872	74,955	—	—	—
El Dificil	El Dificil, Oligocene	1943	—	758,898	541,203	24	8	—
Floresanto	Paujil, Miocene	1945	100	11,171	0	11	0	0
Galan	A-Zone, Oligocene	1945	426	123,039	27,948	5	—	—
Infantas	B-C Zones, Oligocene and Eocene	1918	5,750	150,008,151	2,340,373	499	—	—
La Cira	A-B-C Zones, Oligocene and Eocene	1926	12,265	228,148,654	6,650,949	844	—	—
Las Monas	—	1926	360	74,509	—	17	1	—
Petrolea, North Dome	La Luna, Cogollo, and Uribante, Cretaceous	1933	4,200	28,641,961	2,028,575	148	0	10
Petrolea, South Dome	Cogollo, Cretaceous	1937	—	—	—	—	—	—
Rio de Oro	Catatumbo, and Mito Juan, Cretaceous	1920	420	66,149	0	13	—	—
Tibu	Barco, Catatumbo, Cogollo, and Uribante, Eocene and Cretaceous	1940	8,000	15,924,206	5,958,801	96	31	0
Velasquez	Guaduas, Eocene	1946	210	82,469	47,469	5	2	2

Industry Well Completions in 1948 (Lahee Classification) Venezuela

Operator	Field Wells				Outposts				Deep Tests				New-Pool Wildcats				New-Field Wildcats				Grand Total			
	O	G	D	T	O	G	D	T	O	G	D	T	O	G	D	T	O	G	D	T	O	G	D	T
Creole	206	1	7	214	24	—	7	31	1	—	—	1	—	—	—	—	1	1	8	10	232	2	22	256
Meneg	111	—	—	111	34	1	4	39	—	—	—	—	—	—	—	—	6	2	1	9	151	3	5	159
Shell	225	1	2	228	14	—	2	16	1	—	—	1	—	—	—	—	—	—	—	—	240	1	4	245
Atlantic	16	—	7	23	7	2	7	16	—	—	1*	1	—	—	—	—	1	—	5	6	24	2	20	46
BCO	2	—	—	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	—	—	2
Mercedes	54	—	6	60	6	—	4	10	—	—	—	—	1	—	—	1	1	—	7	8	62	—	17	79
Orinoco	—	—	—	—	—	—	—	—	—	—	1	1	—	—	—	—	—	—	—	—	—	—	1	1
Phillips	4	—	2	6	3	—	1	4	—	—	—	—	—	—	1	1	—	—	4	4	7	—	8	15
Richmond	17	—	—	17	3	—	—	3	—	—	—	—	—	—	—	—	3	—	4	7	23	—	4	27
Sinclair	4	—	—	4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3	3	4	—	3	7
Socony	16	—	1	17	7	—	1	8	—	—	—	—	—	—	—	—	2	—	2	4	25	—	4	29
Texas	15	—	—	15	3	—	—	3	—	—	—	—	—	—	—	—	—	—	2	2	18	—	2	20
Total E. Ven.	271	—	23	294	76	3	22	101	1	—	1*	2	1	—	1	2	10	2	27	39	359	5	74	438
Total W. Ven.	399	2	2	403	25	—	4	29	1	—	1	2	—	—	—	—	4	1	9	14	429	3	16	448
Total Ven.	670	2	25	697	101	3	26	130	2	—	2	4	1	—	1	2	14	3	36	53	788	8	90	886

* Shallower pool test.

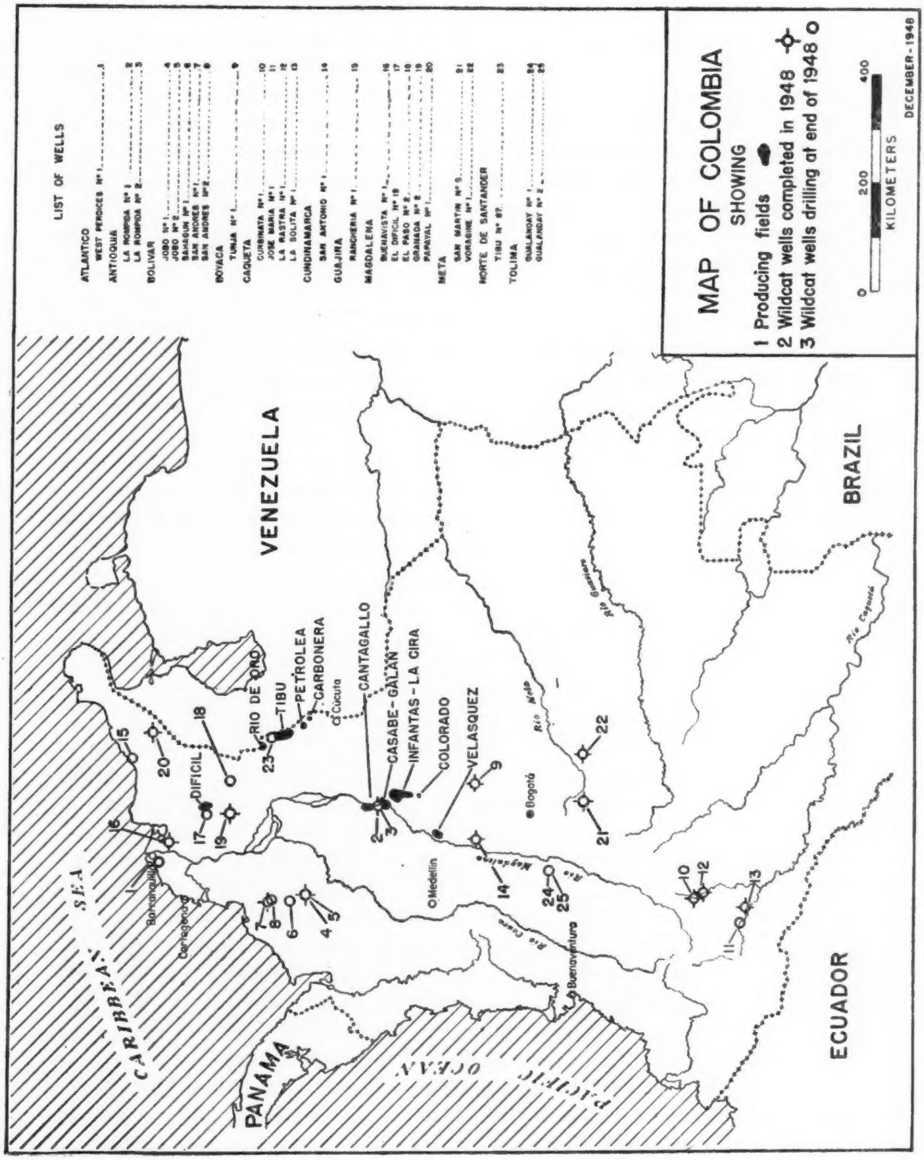

LIST OF WELLS
ATLANTICO
WEST PERDICES N° 1 ... 1
ANTIOQUIA
LA ROMPIDA N° 1 ... 2
LA ROMPIDA N° 2 ... 3
BOLIVAR
JOBO N° 1 ... 4
JOBO N° 2 ... 5
SAHAGUN N° 1 ... 6
SAN ANDRES N° 1 ... 7
SAN ANDRES N° 2 ... 8
BOYACA
TUNJA N° 1 ... 9
CAQUETA
CURBINATA N° 1 ... 10
JOSE MARIA N° 1 ... 11
LA RASTRA N° 1 ... 12
LA SOLITA N° 1 ... 13
CUNDINAMARCA
SAN ANTONIO N° 1 ... 14
GUAJIRA
RANCHERIA N° 1 ... 15
MAGDALENA
BUENAVISTA N° 1 ... 16
EL DIFICIL N° 19 ... 17
EL PASO N° 2 ... 18
GRANADA N° 2 ... 19
PAPAYAL N° 1 ... 20
META
SAN MARTIN N° 5 ... 21
VORAGINE N° 1 ... 22
NORTE DE SANTANDER
TIBU N° 87 ... 23
TOLIMA
GUALANDAY N° 1 ... 24
GUALANDAY N° 2 ... 25
MAP OF COLOMBIA
SHOWING
1 Producing fields
2 Wildcat wells completed in 1948
3 Wildcat wells drilling at end of 1948
0 200 400
KILOMETERS
DECEMBER - 1948
VENEZUELA
BRAZIL
ECUADOR
PANAMA
CARIBBEAN SEA
PACIFIC OCEAN
RIO DE ORO
TIBU
PETROLEA
CARBONERA
Cucuta
CANTAGALLO
CASABE-GALAN
INFANTAS-LA CIRA
COLORADO
VELASQUEZ
DIFICIL
Bogotá
Medellin
Barranquilla
Cartagena
Buenaventura

FIG. 8

from the previous year. Only 70 exploitation wells were completed in 1948 as compared with 139 in 1947. Of these 70 wells, 63 were crude producers and 7 were dry holes. In the Barco concession, Colombian Petroleum, as in 1947, confined exploitation drilling to its Tibu field. Thirty-one wells were drilled in this field, 30 of which were producers. In the Yondo concession, Shell Oil Co. drilled 28 wells in its Casabe field, 26 of which were producers. In the El Dificil concession, Shell drilled 8 wells in the El Dificil field, 7 of which were producers. In the Velasquez field, located in the Velasquez private lease, Texas drilled 2 wells, both dry holes. And in the Las Monas field, Socony drilled one well, also a dry hole. No drilling took place in the De Mares concession.

EXPLORATION DRILLING

The poor exploratory results obtained during 1946 and 1947, coupled with continued unfavorable petroleum legislation, are reflected in the decreased exploratory effort made by the industry in 1948. This is more true of exploration surveying than of wildcat drilling, but even wildcat drilling registered a decline. In 1948, 15 wildcat wells were completed and 10 were drilling at the end of the year. This compares with 18 completed and 9 incompleted wells in 1947. As in 1947, all of the wildcats drilled in 1948 were dry holes. Following is a list of the completed wells and the accompanying map shows their location.

IMPORTANT WILDCATS COMPLETED IN 1948

Name of Well	*Total Depth (Feet)*	*Deepest Horizon Reached*	*Drilled by*	*Remarks*
Rompida 1	5,590	Cretaceous	Cia. Pet. d. Cimitarra (Shell-Socony)	Dry-Abd.
Rompida 2	1,773	Basement	Cia. Pet. d. Cimiterra (Shell-Socony)	Dry-Abd.
Jobo 1	6,944	Basement	La Junta Pet. Co. (Texas-Socony)	29,000 mcf. gas daily
Jobo 2	7,504	Basement	La Junta Pet. Co. (Texas-Socony)	Dry-Abd.
San Andres 1	7,365	Upper Cretaceous	Cias. Unidas (Sinclair-Cities Service-Richfield)	Dry-Abd.
Tunja 1	6,983	Upper Cretaceous	Tropical Oil Co.	Dry-Abd.
Curbinata 1	3,117	Basement	Sabanas Pet. Co. (Texas Pet. Co.)	Dry-Abd.
La Rastra 1	3,094	Basement	Sabanas Pet. Co. (Texas Pet. Co.)	Dry-Abd.
Solita 1	3,740	Basement	Putumayo Pet. Co. (Texas Pet. Co.)	Dry-Abd.
San Antonio 1	8,570	Miocene	Caldas Pet. Co. (Tropical-Texas)	Dry-Abd.
Buenavista 1	11,590	Oligocene	Texas Pet. Co.	Dry-Abd.
Granada 2	4,504	Lower Miocene	Pet. Ariguani (Trop.-Natl. Int.)	Dry-Abd.
Papayal 1	2,577	Jurassic	Cia. Pet. del Cravo (Tropical)	Dry-Abd.
San Martin 5	7,996	Basement	Cia. de Pet. Shell	Dry-Abd.
Voragine 1	6,482	Basement	Cia. Pet. El Condor (Shell)	Dry-Abd.

The highlights of this drilling effort are presented as follows.

Llanos basin.—Two wells were completed in this basin during the year and none were drilling at the end of the year. The two completed wells were Shell's Voragine No. 1 and Shell's San Martin No. 5. Shell's Voragine No. 1, in the southeastern end of the Llanos basin, had a total depth of 6,482 feet and ended in basement. One heavy oil showing was obtained in this well in sands of possible

Cretaceous age, but testing of these sands failed to result in commercial production. The San Martin No. 5 well, in the southwestern end of the basin, had a total depth of 7,996 feet. At its total depth the well was in Paleozoic basement. No oil or gas showings of importance were registered in the well. With the abandonment of these two locations, Shell suspended its Llanos exploration program, thus terminating an exploratory effort started in 1941. During the 8 years that Shell was conducting its exploration of the Llanos, it drilled 11 wildcat wells and invested approximately 10 million dollars. At the present time no company is exploring in the Llanos and it is doubtful that exploration of this large basin will be resumed by anyone on a major scale until present petroleum legislation is modified sufficiently to make investments in this remote region more attractive.

Putumayo-Caqueta basin.—The Caqueta-Putumayo basin of Colombia is part of the large basin area which extends from the Macarena hills in Colombia southward along the east side of the Andes through Ecuador and Peru. In this basin, three wells were completed during the year, and one well was drilling at the end of the year.

All of the drilling in the basin was carried out by the Texas Petroleum Company. The completed wells were Curbinata No. 1, located west of the Rio Orteguaza approximately 40 kilometers south of Florencia, La Rastra No. 1 on the west bank of the Rio Orteguaza approximately 50 kilometers southwest of Florencia, and La Solita No. 1 on the north bank of the Rio Caqueta approximately 80 kilometers south of Florencia. All three wells were abandoned as dry holes in basement, and it is reported that all three had showings of heavy oil in Tertiary sands. The total depths of these wells are as follows: Curbinata No. 1—3,117 feet, La Rastra No. 1—3,094 feet, and La Solita No. 1—3,740 feet.

At the end of the year, Texas Company's Jose Maria No. 1, located on the south bank of the Rio Caqueta, approximately 80 kilometers southwest of Florencia, had reached a depth of 4,640 feet and was fishing.

Bogotá plateau.—During the year, Tropical Oil Company completed its Tunja No. 1, located approximately 5 kilometers east of the town of Tunja. The well was abandoned as a dry hole in Cretaceous strata after reaching a total depth of 6,983 feet. No oil or gas showings were recorded.

Upper Magdalena basin.—In this basin one well was completed during the year and two wells were drilling at the end of the year. The completed well was the joint Tropical-Texas San Antonio No. 1, located 20 kilometers downstream from Honda on the east side of the Magdalena. At its total depth of 8,570 feet the well was in Tertiary strata. No oil or gas showings were recorded in the well.

The two incompleted wells were the joint Tropical-Richmond Gualanday No. 1 and Gualanday No. 2, both located on the Gualanday anticline, approximately 20 kilometers west of Girardot. At year's end Gualanday No. 1 was drilling in Cretaceous strata at 6,521 feet and Gualanday No. 2 was drilling in Tertiary strata at 940 feet. Several oil and gas showings have been recorded to date in Gualanday No. 1.

Middle Magdalena basin.—Two wells were completed in this basin during the year, and none was drilling at the end of the year. The completed wells were drilled by Socony-Shell on the Cimitarra concession, which lies north of Shell's Casabe field. The wells were La Rompida No. 1 and La Rompida No. 2. La Rompida No. 1 was abandoned as a dry hole in Cretaceous strata at 5,590 feet, while La Rompida No. 2 was abandoned as a dry hole in basement at 1,173 feet.

Lower Magdalena basin.—Two wells were completed in this basin during the year and two were drilling at the end of the year. Ariguani's Granada No. 2, in the south part of the basin, was drilled 4,504 feet, where it was abandoned as a dry hole in Tertiary strata. Texas Company's Buenavista No. 1, approximately 30 kilometers east of Barranquilla, was abandoned as a dry hole in Tertiary strata at 11,590 feet. Both wells had showings of gas. At the end of the year Shell's El Dificil No. 19, located 6 kilometers west of the El Dificil field, was drilling at 6,175 feet in Tertiary strata, and Tropical's West Predices No. 1 located 20 kilometers west of Barranquilla, was drilling at 10,296 feet in Cretaceous strata.

Cesar basin.—No wells were completed in this basin during the year but one location was active at the end of the year. The active location was Tropical's El Paso No. 2 in the south part of the basin, 17 kilometers northeast of El Paso No. 1, drilled in 1947. At year's end the well was fishing after having reached a depth of 8,783 feet.

Rancheria basin.—During the year, Tropical Oil Company completed its Papayal No. 1, the first well to be drilled in this basin. The well was abandoned as a dry hole at 2,577 feet in basement. Several showings of oil and gas were obtained.

Guajira basin.—The Guajira basin occupies the southern part of the Guajira Peninsula in northeast Colombia. No wells were drilled in this basin prior to 1948, but in September, 1948, the Shell Company spudded a well (Rancheria No. 1) approximately 6 kilometers east of Riohacha. At year's end this well was at 6,178 feet in basement rocks.

Maracaibo basin.—In the Barco concession, Colombian Petroleum Company was preparing to abandon as a dry hole its Tibu No. 87, located approximately 18 kilometers northwest of the Tibu field. The well had a total depth of 7,767 feet at the end of the year.

Sinu basin.—In this basin area, three wells were completed during the year, and two were drilling at the end of the year. Texas-Socony completed two wells, Jobo No. 1 and No. 2, in their Tablon concession east of the Sinu region. Jobo No. 1 was completed as a gas well, after having reached a total depth of 6,944 feet and Jobo No. 2 was abandoned as a dry hole after reaching a depth of 7,504 feet. Both of these wells bottomed in igneous basement. The Tripet Company, owned jointly by Cities Service, Richfield, and Sinclair, abandoned its San Andres No. 1 as a dry hole at 7,365 feet in Cretaceous? strata. No significant oil or gas showings were reported. At year's end Texas-Socony's Sahagun No. 1, located 20 kilo-

meters northwest of their Jobo wells, was drilling at 5,232 feet and Tripet's San Andres No. 2, east of their San Andres No. 1, was drilling at 5,793 feet.

EXPLORATION SURVEYS

The decline in the industry's exploratory effort during 1948, previously noted, is particularly marked in the exploration surveys carried out. In 1948, the industry conducted 299 party months of geological surveys, 56 party months of gravity-meter surveys, 37 party months of magnetic surveys, and 100 party months of seismograph surveys. These are comparable with 488 party months of geological surveys, 72 party months of gravity surveys, and 133 party months of seismic surveys in 1947, and represent a reduction of about 30%.

During the early part of the year, Gulf Oil Company completed the airborne magnetic survey of the basin areas east of the Andes started in 1947.

CONCESSION ACTIVITIES

At the close of the year, the industry held 2,643,126 hectares of land under national concession and had an additional 16,538,534 hectares under concession application. At the end of 1947 the status was 2,238,296 under concession and 17,673,353 hectares under application. The increase in lands under concession at the close of the year as compared to 1947 is accounted for by the Texas Company's large acquisitions in the Caqueta-Putumayo basin. In this basin Texas acquired 598,599 hectares of concession during 1948. Not reflected in this statistical statement is the withdrawal of Shell from the Llanos basin and its surrender of several large tracts of land in the region, nor the surrender by Tropical of several large tracts in the Llanos and on the Bogotá plateau.

PIPELINING

Shell's El Dificil field of north-central Colombia, approximately 80 kilometers east of the Magdalena River, was tied into the Andian trunk line system with a combination 6- and 8-inch line, in the early part of the year.

At the end of the year, preliminary surveys were under way for a 6-inch products line paralleling the Magdalena River from Puerto Berrio to La Dorda. The proposed line will be approximately 120 kilometers long, and its construction will be financed by the Government. At Puerto Berrio, its downstream terminal, it will tie in to Tropical's 6-inch products line from the De Mares concession.

LEGISLATION

Congress took no action during 1948 on the oil bill which was in the hands of the Senate Oil Committee at the close of the congressional session in 1947. Failure to take any action in 1948 automatically killed this bill, and thus any future attempt to modify existing petroleum legislation will necessitate the introduction of a completely new measure. Though oil legislation remained unchanged during the year, the Government created a national oil company. The

company is constituted to engage in all phases of the petroleum industry and provision is made for private share participation along with Government participation. Creation of this company places the Government in a position to operate producing concessions, such as the De Mares, when they revert to the nation upon the expiration of their normal exploitation life.

Ecuador

The writer was unable to obtain any information on developments in the old oil fields of Santa Elena Peninsula from which all of Ecuador's production to date has come. Production from the Santa Elena fields was at the rate of approximately 7,000 barrels daily in 1948, up about 6% from that of 1947. Cumulative production totals 44,488,000 barrels.

In the large concession of Shell Company of Ecuador, Ltd. (now jointly owned by Shell and Esso Standard Oil Company (Ecuador), S.A.) lying east of the Andes, all geological and geophysical work was suspended throughout 1948. Three wildcat wells were completed during the year, bringing to five the number of exploratory wells completed without commercial discovery. Wells completed in 1948 were: Cangaime (total depth, 3,540 feet) in the southwestern part of the concession, Oglan (9,438 feet) in the west central, and Tiputini (5,515 feet) in the eastern part of the concession. The section drilled in all wells is of Tertiary and Cretaceous age. All drilling and other equipment and supplies used in drilling wells in eastern Ecuador are flown in by plane to landing fields constructed in the heart of the east Ecuador rain forest.

During the year 50% of the original concession area of somewhat over 8 million hectares (roughly 20 million acres) was relinquished.

Preparations were in progress at the end of the year to begin the drilling of Villano No. 1 in the west-central part of the concession, and also to resume reflection-seismograph work.

Peru

Petroleum production in Peru for 1948 totaled about 14,068,900 barrels or approximately 38,440 barrels per day, the highest rate attained since 1944. This represents about an 11% increase over the year 1947 when the total production was 12,763,807 barrels, or 34,969 barrels per day. Peru has produced petroleum since the 1860's with production records available from 1884, since which time the cumulative production is approximately 372,246,000 barrels. As may be noted in the following tabulation, International Petroleum Company continues to be the major producer in Peru.

With the exception of the Aguas Calientes field, which lies in the Amazon drainage system to the east of the Andes, all of Peru's production is obtained from fields on the coastal plain of northwestern Peru. International accounted for practically all of the increase in Peru's production in 1948 over that of 1947. This

CRUDE PRODUCTION

	1947 Total	1947 Daily Average	1948 Total	1948 Daily Average
International Petroleum				
La Brea-Parinas Estate	10,205,658	27,961	11,362,498	31,045
Cia. Lobitos				
Lobitos and El Alto	2,321,976	6,361	2,472,969	6,757
Peru Government				
Zorritos and Organos	118,172	324	112,639	296
Cia. Ganso Azul				
Aguas Calientes	118,001	323	120,810	330
	12,763,807	34,969	14,068,916	38,428

increase was largely the result of a greater rate of development, rather than being due to the discovery of important new reserves.

The following tabulation shows the extent of surface exploration effort expended in Peru during 1948.

SURFACE EXPLORATION

1948 (Party Months)

	Geological	Seismograph	Gravity	Total
International Pet. Co.	38	12	12	62
Socony-Vacuum	30	—	—	30
	68	12	12	92

Practically all surface geological work was conducted in the Montana region to the east of the Andes, while the geophysical work was done on the La Brea-Parinas Estate.

Drilling activities accounted for the completion of approximately 140 exploitation and 32 exploration wells, as here shown.

Company	Oil	Gas	Dry	Total
	Exploitation			
Northwestern Peru				
International	67	3	21	91
Lobitos	41	0	2	43
Government	6*	0	—	6*
	114	3	23	140
Eastern Peru (Montana)				
Ganso Azul	0	0	0	0
Total Exploitation	114	3	23	140
	Exploration			
Northwestern Peru				
International	10	2	19	31
Lobitos	?	?	?	?
Government	?	?	?	?
	10	2	19	31

* No information, estimate only.

Eastern Peru (Montana)				
Ganso Azul	0	0	0	0
Cia. Pet. El Oriente	0	0	0	0
Government	0	0	1	1
	0	0	1	1
Total Exploration	10	2	20	32
Grand total	124	5	43	172

The Peruvian Government's Santa Clara No. 1, abandoned due to mechanical difficulties at a depth of approximately 1,000 feet in Middle Cretaceous sandstone, is the only exploratory well completed during 1948 in the Montana. The Compania Peruana de Petroleo El Oriente started its second test in the Montana, Inca No. 1, in the fall of 1948. This is the third well to be drilled in the Montana region outside of the Aguas Calientes field. At year-end the well was standing at 3,518 feet in Tertiary sediments awaiting equipment.

The above table shows that International completed 10 of its exploratory wells as oil producers on their La Brea-Parinas Estate. Some of these 10 wells are marginal producers and are not considered as commercial discoveries. The discoveries were made in fault blocks adjacent to productive areas and from formations already producing in near-by pools. The several tests drilled at some distance from the productive areas on the Estate were failures. At the end of the year 6 rigs were active on exploratory wells on the La Brea-Parinas Estate.

There was no change in the concession holdings of private companies during the year. No further action was taken on the pending contract between International and the Peruvian Government for a concession, known as the Sechura, which covers part of the National Reserve lands south of the La Brea-Parinas Estate.

In 1948 a governmental decree created the Empresa Petrolera Fiscal as an autonomous governmental commercial enterprise with authority, under certain restrictions, to enter into such negotiations with national or foreign entities necessary to explore and exploit the petroleum wealth of the country. All of the holdings of Establacimientos Petroliferos Fiscales which operated as a branch of a governmental department were transferred to this new organization. The National Reserve lands of northwestern Peru north of the Chira River have been assigned to the Empresa Petrolera Fiscal.

Anticipating new petroleum legislation, which would permit the granting of petroleum concessions in the Montana region of Eastern Peru, several foreign oil companies became interested in the area in 1945 and 1946. As the new legislation did not materialize, interest waned and exploration activities were reduced in 1947 and again in 1948.

At the time of writing, a Government-appointed commission, which includes a representative of the petroleum industry, is in session to draft recommendations for a new petroleum law.

Chile

During the year 1948 the Government's Corporacion de Fomento de la Produccion Chile, operating in the Province of Magallanes at the southern end of the country, carried out 8 geological party months of field work. This was mainly devoted to the study of stratigraphic problems. In geophysics 14 seismograph and 12 gravity-meter crew months of field study were done.

Eight wells were drilled on the Cerro Manantiales (ex-Spring Hill) field, discovered in 1945 as the world's most southern oil field on the northern part of the Island of Tierra del Fuego. Six of the 8 wells are oil wells and 2 are gas wells. The operators believe that the latter may be recompleted as oil wells by work-over jobs. To date about 16 wells have been drilled on this structure, all but about 2 of which were completed as oil or gas wells.

Production at Cerro Manantiales is shut in because outlet facilities have not yet been established. The field is now considered to be capable of producing a minimum of 3,000 barrels daily, though potential production is said to be considerably higher. This compares with a daily consumption of 16–18 thousand barrels of petroleum products in the country. Plans are under way for the construction of a 50-mile pipeline outlet to deep water on the Straits of Magellan. Consideration is also being given to the installation of a gasoline and recycling plant at the field.

During 1948 Espora No. 1 wildcat, 8 miles north of Cerro Manantiales, was completed as a dry hole, as was also San Sebastian No. 1, located 50 miles southeast of the same field. The latter well had first been reported in the press as a discovery. San Sebastian No. 2 on the same structure failed also to produce due to lack of permeability in the sand.

The oil accumulation at Cerro Manantiales and the sands reached in the Espora and San Sebastian wells are pre-Eagle Ford, and are thought to be Lower Cretaceous or Jurassic in age. Depth of production at Cerro Manantiales is about 7,400 feet. Gravity of the oil is about 43° A.P.I.

Preparations are being made to drill two new wildcats: Espora No. 2 and Cerro Sombrero No. 1. The latter location is on a seismograph structure which follows a gravity-meter anomaly and is 15 miles south of the Cerro Manantiales field.

Argentina

Very little information was available to the writer on developments in Argentina during the year 1948. Crude-oil production approximated 64,000 barrels daily, up 6.8% from the 59,900 barrels daily in 1947. The Argentina Government Company, Yacimientos Petroliferos Fiscales (Y.P.F.) produced 70% of the total 1947 output, and presumably produced a similar percentage of the total in 1948. The balance was produced by various private companies. Cumulative production in Argentina amounts to a little over 409 million barrels, of which about 73.2% has come from the Comodoro Rivadavia field in Patagonia, 7.5% from the Neu-

quen fields of northern Patagonia, 12.5% from the Mendoza fields of west-central Argentina, and nearly 7% from the Salta fields of northern Argentina.

So far as the writer is aware, there were no oil discoveries or other developments of unusual interest in 1948. In our review of a year ago, we reported that a contract had been signed in the latter part of 1947 between Y.P.F. and Drilling and Exploration Company of Nevada (Brantly), calling for the drilling of 40 exploration wells in various parts of the country. It is the writer's understanding that the execution of this program has been held up due to difficulties in securing the dollar exchange needed for the purchase of drilling equipment. However, it is understood that a limited number of rigs has been arranged for and that the program will be carried forward on a reduced basis.

Work continued during 1948 on the construction of the 1,142 miles of 10-inch gas line from the Comodoro fields northward to supply the city of Buenos Aires and other places *en route*. About 30% of the line had been constructed in September, 1948, and it is planned to have the line completed by the end of 1949. The National Gas Administration has charge of this job. This entity, which has the monopoly for the marketing of fuel gas and liquid propane gas in the country, was formerly a branch of Y.P.F., but since September, 1945, it has had autonomous status and, together with Y.P.F., the Solid Fuel, Vegetable Fuel and the Water and Electric Power Administrations, it is under the jurisdiction of the National Administration of Energy.

According to latest reports, the actual daily gas production in the Comodoro fields amounted to 24,600 MCF for Y.P.F. and 18,700 MCF for the private companies, most of which is used for fuel and pressure maintenance. Y.P.F. has been engaged in an attempt to increase gas reserves by drilling wells in gas areas, as the amount of gas produced with the oil is relatively small. Refinery and coal gas consumption in the Buenos Aires area is reported to be 15,000 MCF daily. The requirements of the areas traversed by the line may be of similar size. According to published reports, it is planned to install enough compressor capacity ultimately to displace a maximum of 42,000 MCF daily at compressor discharge pressures of 1,000 p.s.i.

Estimates of gas reserves in the Comodoro area are reported to vary from 500 to 850 billion cubic feet, though earlier estimates reported were very much higher.

Late in 1948 the Argentina Secretariat for Industry and Commerce announced that Y.P.F. planned the building of a large modern refinery in the District of Matanza near Buenos Aires.

Bolivia

Production in the Bolivian fields during 1948 was as follows, in barrels.

Field	*1947*		*1948*		*Cumulative*
	Total	*Daily*	*Total*	*Daily*	
Camiri	164,510	451	267,440	731	1,834,090
Sanandita	100,800	276	88,820	243	1,617,660
Bermejo	112,050	307	107,300	293	860,080
Total	377,360	1,034	463,560	1,267	4,311,830

Yacimientos Petroliferos Fiscales Bolivianos (Y.P.F.B.), Government company, has been the sole operator in Bolivia since the fields and leases of the Standard Oil Company of Bolivia (Standard Oil Company (N.J.)) were expropriated in 1937.

Camiri is potentially the most important field. Its production is limited to the capacity of the topping plant located at Camiri. Y.P.F.B. report that the field has a potential production of about 3,500 barrels daily, and they state that they hope to increase this potential to 5,000 barrels daily in 1949.

A pipeline is under construction from Camiri to Cochabamba, with a branch line to Sucre. At these terminal points refineries with daily capacities of 3,000 and 5,000 barrels daily, respectively, are under construction. Laying of the pipelines is being carried out by Williams Brothers Company, and the refineries are being constructed by the Foster Wheeler Corporation. Y.P.F.B. report that both the pipelines and the refineries will be completed in 1949. Lack of materials is said to hold up developments at Sanandita and Bermejo.

The following table summarizes drilling activity during 1948.

Area	*Number of Wells*		*Remarks*
	Being Drilled	*Completed*	
Camiri	7	5	4 producers—1 salt water well
Quayruy	1	—	Wildcat
Sanandita	1	—	Exploitation well
Bermejo	1	—	Deepening job
Mandeyapecua	1	—	Wildcat
Total	11	5	

Development at Camiri was interesting particularly in partially outlining the field along the flanks and in proving the existence of two productive zones in the Devonian separated by shales. At Quayruy, as reported last year, Well No. 1, which was drilled at an old location made by the Standard Oil Company of Bolivia, was completed in December, 1947. Initial production of 300 barrels daily through a $\frac{1}{4}$-inch choke is reported. Well No. 3, now drilling, has topped the Devonian at 355 meters and is expected to be completed at about 600 meters. The exploratory well at Mandeyapecua was drilling at 735 meters early in 1949. It is expected to top the Devonian at around 1,000 meters and to be completed at a depth of about 1,400 meters.

Geologic activity of Y.P.F.B. was concentrated largely in two areas considered by them to be of particular promise. One of these is the Los Monos anticlinal structure 40 miles north of the Sanandita field. It is one of the scores of structures studied in reconnaissance and detail by the Standard Oil Company of Bolivia. It is eroded into the Devonian Los Monos shales, and Y.P.F.B. have selected a location for drilling the first well in anticipation of finding oil at shallow depth.

The other area of active geologic and topographic study during the year was the Izozog structure area about 60 miles in a straight line northeast of Camiri. As the greater part of the area is flat, geophysics will be used in outlining structure.

Y.P.F.B. report that "there has been no change in the concession situation" during the year "due to the fact that the Congress has not yet sanctioned the law which would regulate the operation of mixed companies."

PARAGUAY

The Union Oil Company of California carried on the only exploration for oil in Paraguay during 1948. Some minor geological studies were made in Paraguay Oriental on the east side of the Rio Paraguay but the major portion of the exploration effort was centered in the 23-million acre exploration concession in the Chaco west of the river. Three seismograph crews were employed in working widely scattered parts of the Chaco during the first eleven months of the year. Since December 1, the geophysical work has been confined to one seismic party.

Union's third drilling venture resulted in a dry hole and was abandoned at a total depth of 10,331 feet. This well, known as Pirizal No. 1, was 100 miles south of the two previous wildcats, Santa Rosa No. 1 and La Paz No. 1, reported on in previous years. Pirizal No. 1 encountered a thick continental section and was bottomed in redbeds. The fourth test will be drilled near Picuiba, in the northwestern Chaco.

BRAZIL

Following a plan of exploration outlined in 1944 by E. DeGolyer, the Conselho Nacional do Petroleo (National Petroleum Council) continued its study and other operations throughout the year in the states of Bahia, Sergipe, Alagoas, Piaui, Maranhao, Goias, Para, and Parana.

Bahia.—Since the discovery of oil in 1939 in the Reconcavo area of the Bahia basin in the State of Bahia, the following oil fields have been discovered: Lobato-Joanes, Aratu, Itaparica, Candeias, and Dom Joao. The first three named are completely drilled up. Activities during 1948 consisted in the development drilling of Candeias and proving of the extension of Dom Joao, discovered in 1947, all with the objective of preparing the fields for production as soon as facilities for handling it have been arranged.

Outside of the fields, search for and study of new structures continued in the 400 kilometer-long sedimentary area which extends from Reconcavo to the Rio Sao Francisco. Several wildcats were drilled in the search for new oil pools.

At the close of 1948 a total of 147 wells had been completed in the State of Bahia. Sixteen wells were completed in 1948 and 4 more were drilling at the close of the year. Of the 16 wells completed in 1948, 14 are oil wells and 2 are dry holes. In 1948, 17,316 meters (56,814 feet) of hole were made, of which 9,779 meters were drilled on Candeias, 1,937 meters on Dom Joao and 5,600 meters in wildcat wells. Santo Antonio No. 1, a wildcat somewhat over 2 kilometers east of Candeias, reached a depth of 2,770 meters (9,088 feet) and is the deepest hole in Brazil. Though dry, this well provided many data of stratigraphic value and served to show how variable the stratigraphic thickness is in this basin. At the close of

1948 a total of 136,154 meters (446,721 feet) of hole had been drilled in Bahia since the beginning of operations in 1939. Out of the 147 wells completed during this period, 80 are oil wells, 13 are gas wells, and 54 are dry holes.

Not including reserves of less than 100,000 barrels at Lobato-Joanes and Aratu, oil reserves are estimated as follows.

	Barrels
Candeias	9,647,000
Itaparica	3,550,000
Dom Joao	4,648,000
Total	17,845,000

It is tentatively figured that reserves on the Dom Joao field were doubled by the completion late in 1948 of Dom Joao No. 12 on a southward extension of the field.

Reserves of natural gas in the Aratu, Itaparica, and Candeias fields are estimated at 1,215,407,000 cubic meters or nearly 43 billion cubic feet.

Oil in the Bahia or Reconcavo basin is all of paraffin base, and its paraffin content varies not only between fields but in different parts of the same field. The oil of Dom Joao is the most fluid and is richest in light products. Cumulative production in Brazil, all from the Bahia basin, is 529,890 barrels, of which 143,405 barrels (or 392 barrels daily) were produced in 1948. Production is limited to that required by a rudimentary refinery plus that utilized by the Conselho as fuel and for road dressing at the fields.

Sergipe.—Along the coast of this state in northeastern Brazil, and extending northward from Bahia, is a narrow overlap of sedimentary beds in which traces of oil occur. In September, 1946, the Conselho Nacional do Petroleo began geologic studies along this overlap, concentrating in the central and northeastern part of the belt. In 1948 seismic studies were added to those of the surface geology in order to get a more accurate picture of the basin form and sedimentary thickness and to define structures revealed by the surface geology. This seismic study will be continued in 1949 and the first exploratory drilling will also get under way.

Alagoas.—The sedimentary overlap described above continues northeastward along the coast of Alagoas with a width of 20–30 kilometers. Flat Tertiary strata are underlain by older, somewhat deformed sediments in which traces of oil have been noted. Geologic studies were carried out in this belt in 1948, and in 1949 it is hoped that known structures will be sufficiently defined so that exploratory drilling may be started.

Piaui, Maranhao, and Goias.—In the region of northeast-central Brazil covered by the states of Piaui, central Maranhao, and the northern part of Goias lies a basin containing sediments of Devonian up to Cretaceous age. The total thickness of sedimentary fill in this basin is not accurately known but it is thought to be between 1,500 and 2,000 meters. Geologic exploration was started by the Conselho in this basin in 1946. It has served to determine the age and character of these sediments and it has indicated that the major petroleum possibilities are

included by an area of 610,000 square kilometers (235,000 square miles) situated in the central part of the State of Maranhao. It is hoped that structure of anticlinal nature will be sufficiently defined in this structurally little-disturbed basin to permit the initiation of exploratory drilling before the close of 1949.

Para.—The Paleozoic sedimentary basin of the Amazon is very large and little disturbed. The Conselho began refraction seismograph operations in 1946 on the Island of Marajo in order to determine the thickness of the sediments and outline areas possibly favorable for oil accumulation. Seismic refraction and reflection studies have been extended from the region of Marajo up the Amazon basin as far as the city of Monte Alegre. The work has indicated the existence of a sedimentary trough about 100 kilometers in width and over 3,000 meters deep extending north-south across the Island of Marajo and the bay of the same name and continuing southeast across the Rios Tocantins, Acara, Moju, and Capim. A combination of gravimetric and reflection-seismograph study has verified the presence of anticlinal structures which will require somewhat more detailing prior to the location of exploratory wells. It is anticipated, however, that drilling will get under way in the Marajo area in 1949.

Parana.—The large Parana basin of southern Brazil contains a maximum thickness of 1,800 meters of very low-dipping Paleozoic sediments considered to have petroleum prospects. Overlying these formations are Mesozoic sandstones and varyingly thick basaltic lava flows of Triassic age. Conselho Nacional do Petroleo began seismic and geologic studies in the Ponta Grossa area of the State of Parana in 1946. These studies, which continued through 1948, have extended northward to the State of Sao Paulo. The studies are primarily structural with the view to selecting exploratory drilling locations.

Eastern Hemisphere

Great Britain

In 1948 the D'Arcy Exploration Company (Anglo-Iranian Oil Company) drilled 28,500 feet of exploratory footage and 7,798 feet of production footage.

No new fields were discovered, but the previous decline in the producing fields was arrested by commencement of a program of secondary recovery by water injection. The following table gives the production in Great Britain by fields for the years 1947 and 1948.

	1947			*1948 (Provisional)*		
	Total		*Bbls. Daily*	*Total*		*Bbls. Daily*
	Tons	*Barrels*		*Tons*	*Barrels*	
Eakring/Duke's Wood	33,776	252,476	690	32,498	243,236	665
Kelham Hills/Caunton	13,057	94,443	258	10,640	76,993	210
Formby	365	2,738	7.5	290	2,174	6
Totals	47,198	349,657	955.5	43,428	322,403	881

FIG. 9

Cumulative production has attained approximately 4,219,000 barrels.

In the Midlands, in Nottinghamshire, eight exploration wells were drilled. Hockerton No. 2 (2,950 feet) and Kirklington (2,796 feet) located just east and south of the Duke's Wood field, were drilled to the Lower Carboniferous limestone, which showed some oil impregnation, but on testing yielded water only. At Farndon, 10 miles southeast of Eakring, the Millstone Grit was tested (2,545 feet) in the search for a stratigraphic trap updip from an early well at Kelham which had had a promising oil show—but without results. A test at Eagle Moor (3,418 feet) about 6 miles west of Lincoln, drilled on a small seismic closure, found oil impregnation in a Lower Carboniferous limestone but yielded only water on testing. Four wells were drilled at Wysall, south of Nottingham City, in the search for Millstone Grit oil, without success. A thick sheet of dolerite (150–200 feet thick) was present in the basal Coal Measures.

In Shropshire, near Market Drayton, two wells, Stoke-on-Tern (1,832 feet) and Tern Hill (2,301 feet), were drilled on seismic structures. No traces of oil were encountered. Lower Carboniferous was reached in both cases. In southern England, Portsdown No. 2 (near Portsmouth) was drilled to 2,871 feet on seismic evidence, but it proved to be structurally lower than No. 1 and was a dry hole.

In the London area an information boring was made at Willesden (2,680 feet) to check the report on a showing in an old boring and to determine the age of the strata. At 1,010 feet the well passed from Gault into Upper Devonian limestones and shales. A small show of gas was observed but no oil.

Extensive seismic and gravity surveys have been in operation throughout the year in the Midlands, and in central and southern England.

Netherlands

The exploration and development of the Netherlands were intensified during 1948 as compared with 1947.

Geophysical Investigations	*1947*	*1948*
Torsion balance	6 party months	—
Gravimeter, landwork	12 party months	5 party months
Gravimeter, waterwork	7 party months	7 party months
Seismic reflection	15 party months	31 party months
Exploration Drilling	4,726 meters	12,374 meters
Exploitation Drilling	17,343 meters	36,187 meters

Seven core holes, 3 exploration, and 42 exploitation wells were completed during the year.

Gravimeter work was done on the Ysel Lake (Ijselmeer); by the end of the year this survey was completed.

The number of seismic reflection crews was increased from 2 to 3 in June, 1948, and 4 crews will be in the field during 1949. Reflection surveys were carried out in the central and northeastern parts of the country.

Exploration drilling was executed with 1,000-meter counterflush and Ideal 50 installations. An obsolete German rig of heavy type was also used.

Gas was discovered in a dolomite of Zechstein age (Upper Permian) at a depth of 2,760 meters (9,055 feet) in an exploration well situated 9 miles west of the Schoonebeek field.

Minor oil shows have been found in the Cretaceous in the well near the town of Delft. Owing to mechanical troubles the well was abandoned. A second well is now being drilled there.

In the first well on the Emmen anticline, 9 miles north of the Schoonebeek field, Liassic was cored below the Albian unconformity. Thus Lower Cretaceous is missing there.

The Schoonebeek field has now 77 producers in the early Cretaceous; 42 wells were completed on this field during 1948. The limits of the field toward the north, east, and south are known, but an extension in a northwestern direction seems still possible.

The production figures for Netherlands, all from the Schoonebeek field, are as follows.

	1947		*1948*	
	Metric Tons	*Barrels*	*(Provisional) Metric Tons*	*Barrels*
Daily average production	583	4,050	1,354	9,410
Total production	212,693	1,478,216	495,539	3,443,996
Cumulative production			778,648	5,411,604

The operations in the Netherlands are being carried on by the Nederlands Aardolie Maatschappij (N.A.M.), a company formed in September, 1947, and owned equally by the B.P.M. (Royal Dutch) and the Standard Oil Company (New Jersey), the former acting as operator.

France

Oil production in France for the year 1948 totaled about 400,000 barrels, or 1,100 barrels daily, which is comparable with about 1,150 barrels daily in 1947. Of the 1948 production, 960 barrels per day came from the old Pechelbronn fields of Alsace in the upper Rhine graben. Of this production, 535 barrels daily were from wells and 425 barrels per day from shafts or mining operations. Pre-war production at Pechelbronn was about 1,400 barrels daily. The remainder of the 1948 production, say about 140 barrels daily (plus perhaps 180 barrels per day of gasoline from natural gas for a total of 320 barrels per day), was produced from the Regie Autonome des Pétroles' St. Marcet field near Saint Gaudens off the Pyrenees front in the Aquitaine basin of southern France.

The St. Marcet field is mainly a gas producer. Gas production of this field in 1948 totaled 6.2 billion cubic feet, or 17 million cubic feet daily, which compares with 5.2 billion cubic feet, or a little over 14 million cubic feet of gas daily in 1947.

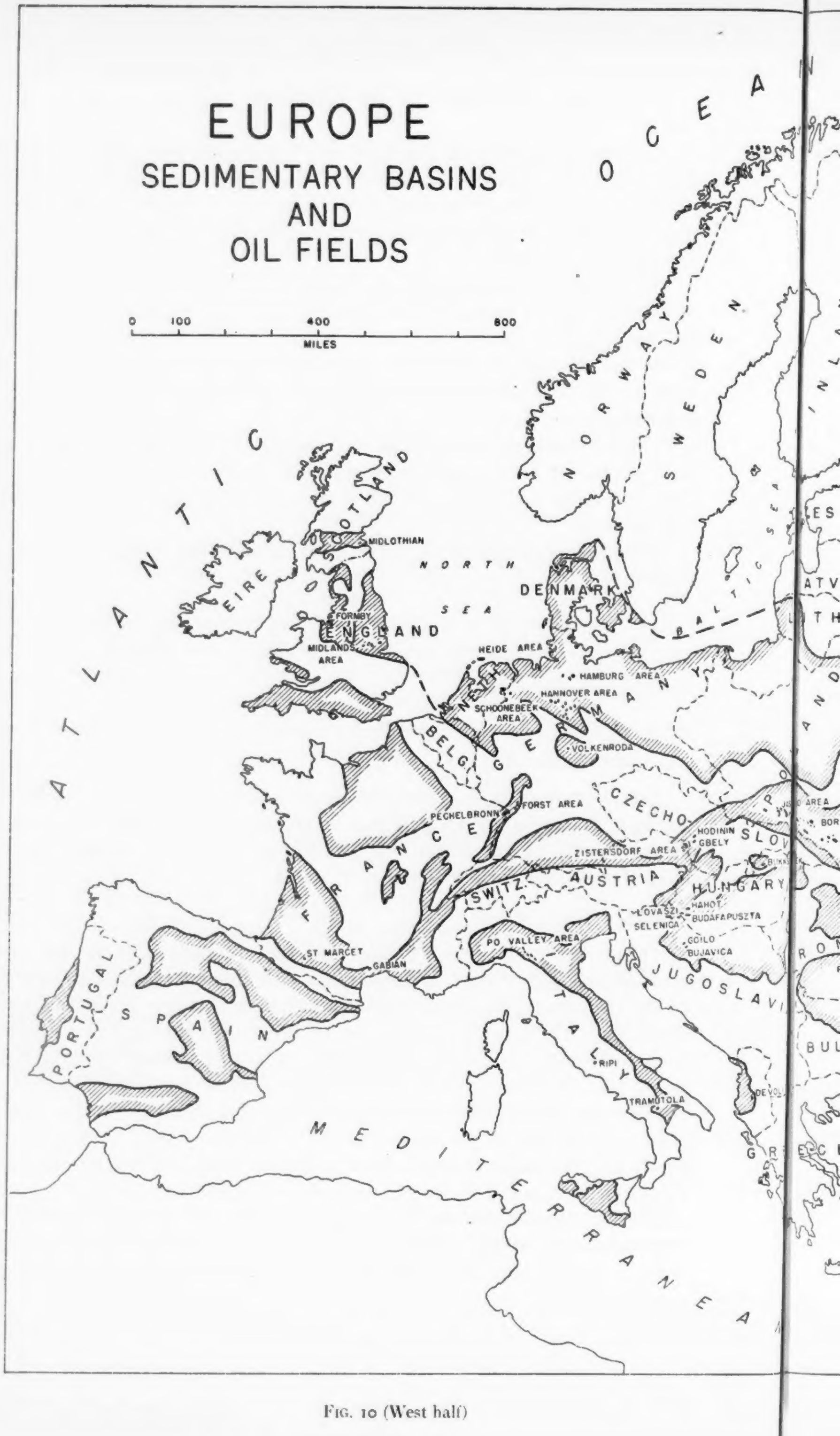


Fig. 10 (West half)

FIG. 10 (East half)

Gasoline is extracted at an absorption plant at Peyrouzet near the field, and the gas is piped to Toulouse, Pau, Tarbe, and other cities through 135 miles of 4-, $5\frac{1}{2}$-, and 6-inch lines. Additional pipeline capacity to Toulouse and a 130-mile 8-inch extension from Toulouse to Bordeaux are expected to be completed by the end of 1949, following which R.A.P. expects to increase its gas outlet to 40 million cubic feet per day.

The following table gives the distribution of geological, geophysical, and exploratory well drilling effort in 1948.

Company	*Party or Crew Months*				*Exploration Wells*	
	Geologic	*Seismic*	*Gravity*	*Telluric*	*Completed 1948*	*Drilling End of 1948*
R.A.P. (a)	5	—	12	—	11	5
S.N.P.A. (b)	3	9	3.5	—	5	4
S.N.P.L.M. (c)	150	8.5	—	4.5	4	8
Pechelbronn	—	—	—	5.5	16 (d)	6
Total	158	17.5	15.5	10.0	36	23

(a) Regie Autonome des Pétroles, southern France.
(b) Société Nationale des Pétroles d'Aquitaine, southern France.
(c) Société Nationale des Pétroles du Languedoc Méditerranée, in the lower Rhone Valley, southeastern France.
(d) On new structures—1; strictly geologic exploratory drilling—4; extension of fields or search for deeper horizons—11.

R.A.P. has about ten rigs running on exploration and exploitation on its 2,000 square kilometers (770 square miles) block in the Pyrenees foothills of south-central France. Some half dozen, mostly surface, structures are known within the limits of the area, and the Cretaceous and Jurassic prospects of most of these have been tested by one or more wells. The St. Marcet field is the only one which has been proved productive. Approximately twenty wells have been drilled on this field, out of which about half are Cretaceous gas wells, and two found a little oil below the gas in Middle Jurassic dolomite. R.A.P. is 100% government owned.

The S.N.P.A. concession of about 24,000 square kilometers (9,266 square miles) covers the balance of the southern half of the Aquitaine basin. S.N.P.A. is a State-controlled organization, with minority participation by a number of private companies. Numerous structures, many of which are diapiric in nature or with salt or anhydrite cores, have been mapped and numerous exploratory wells have been drilled. The first oil showing of any size was reported just after the close of the year in a well at Lalongue near Lembeye in southwestern France. The well is reported as capable of producing 250 barrels daily, which would make it much the best oil well so far completed in southern France.

The S.N.P.L.M. concession is also largely state controlled. Its area is approximately 8,300 square kilometers (3,200 square miles). A number of wildcats have been drilled on the area and eight exploratory rigs are now active there. Minor oil and gas showings have been recorded but so far no commercial production has been obtained within the area outside of that in the old Gabian field north of Beziers. About 190,000 barrels of oil had been produced at Gabian over a period of about 20 years, and at last reports five of the fifteen shallow holes drilled were still producing a total of two or three barrels of oil daily.

France's pre-war refining capacity of about 180,000 barrels daily was reduced by the ravages of war to about 39,000 barrels. Reconstruction has brought this capacity back to that of pre-war and plans are afoot to increase this to well over 300,000 barrels per day by 1952. Under the Monnet Plan for the period 1947–1955, as reported last year, France has ambitious plans to increase her production at home and in the colonies to take care of an anticipated large increase in consumption. To help meet her needs France will also draw on the expected increase in output of Iraq, in which she owns nearly a quarter interest.

Denmark

In Denmark, whose area lies on a northern extension of the North German basin foreland, the Danish American Prospecting Company (Gulf Oil Corporation subsidiary) spudded its second deep test, Gassum-1, and it was drilling at 8,816 feet at the end of the year. Gassum-1 is in east-central Jutland about 45 kilometers north of Aarhus.

Other exploration activities during the year were the following.

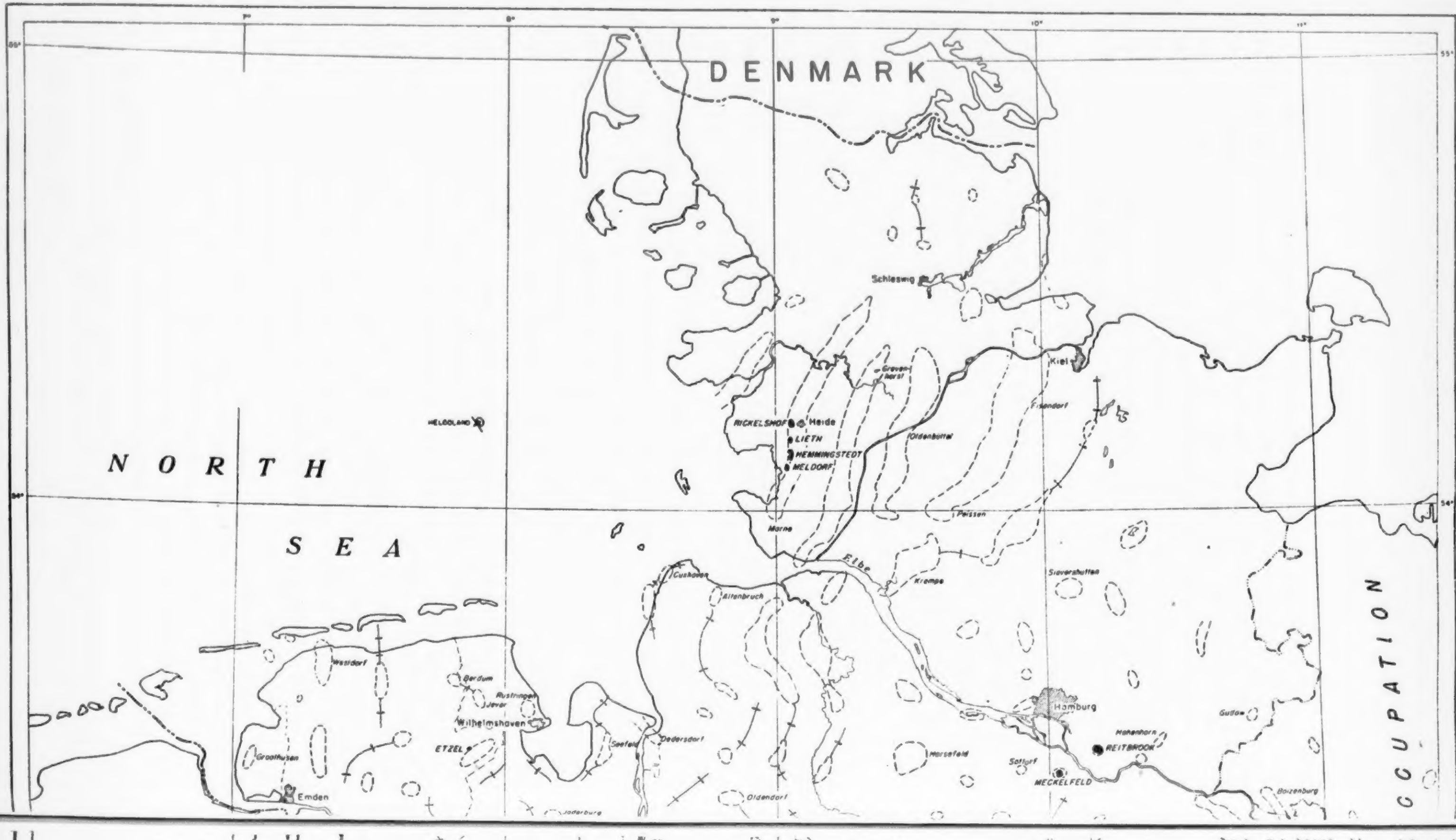
Structure drill—2 portable rigs—24 party months
Gravimeter—6 party months
Seismograph—12 party months

The company also maintains a stratigraphic laboratory.

Germany

Drilling in northwest Germany showed an increase of 51.48% and production an increase of 10.34% over 1947. In exploration drilling, 42 wildcats and 19 extensions of proved area have been drilled, which resulted in 3 successful completions. There is only one discovery (Stemmerberg), the prospects of which are not rated very high. Development in the Emsland may uncover more prolific structures in the near future. Production figures show the growing importance of the Emsland fields, which in 1948 attained 25% of a total German production of 635,240 tons or about 13,000 barrels daily. Sixty-five % of 1948 production came from Cretaceous beds and 30% from the Jurassic. Cumulative production of Germany at the close of 1948 amounted to 12,364,042 tons, approximately 92,635,000 barrels.

Drilling and production increases of 51.48% and 10.34%, respectively, over 1947 were partly due to the stimulating effect of the currency reform introduced in western Germany on June 20, 1948. Although up to that date operators had readily spent cheap Reichsmarks for exploration instead of paying excessive profit taxes, efficiency was low on account of out-dated equipment and the low morale of labor. Since June, 1948, conditions have improved considerably. Through the channels of the Marshall Plan, the German oil industry is trying to catch up with the enormous technical progress in the outside world. Control by Military Government in 1948 became less rigid and in 1949 will turn to advice, leaving more freedom of action to the operators. Prices for crude oil in 1948 were


DENMARK
NORTH SEA
HELGOLAND
Schleswig
Kiel
Heide
RICKELSHOF
LIETH
HEMMINGSTEDT
MELDORF
Oldenbuttel
Marne
Elbe
Cuxhaven
Altenbruch
Krempe
Hamburg
REITBROOK
MECKELFELD
Emden
Wilhelmshaven
Jever
ETZEL
Oldendorf
Dedersdorf
Boizenburg
OCCUPATION

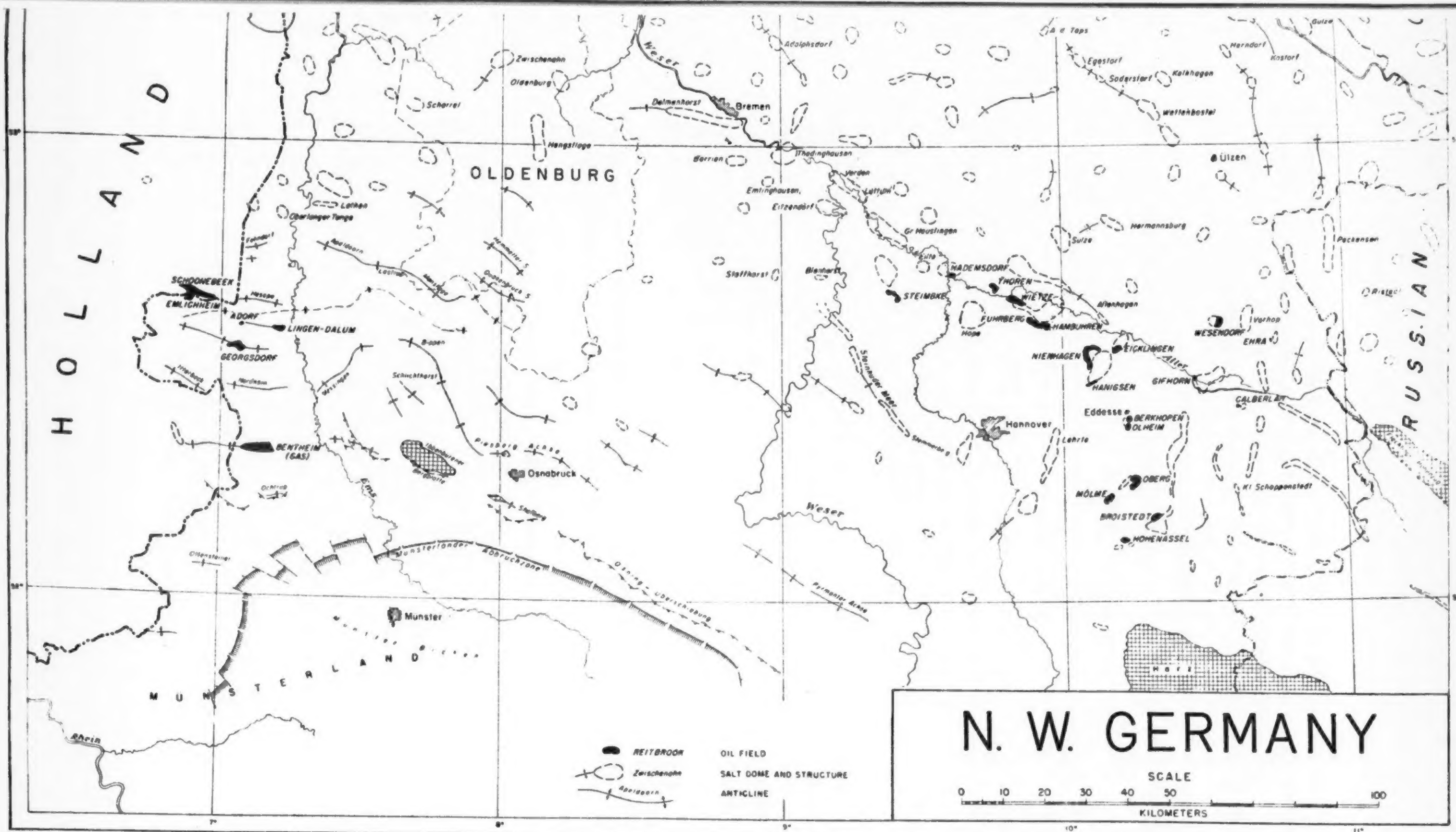

N. W. GERMANY
SCALE
0 10 20 30 40 50 100
KILOMETERS
REITBROOK OIL FIELD
Zwischenahn SALT DOME AND STRUCTURE
ANTICLINE
HOLLAND
OLDENBURG
MUNSTERLAND
RUSSIAN
SCHOONEBEEK
EMLICHHEIM
ADORF
LINGEN-DALUM
GEORGSDORF
BENTHEIM (GAS)
Osnabruck
Munster
Bremen
Hannover
Weser
Ems
Aller
Rhein
Harz
STEIMBKE
NADEMSDORF
THOREN
WIETZE
FUHRBERG
HAMBUHREN
NIENHAGEN
EICKLINGEN
HANIGSEN
GIFHORN
CALBERLAH
WESENDORF
EHRA
BERKHOPEN
OLHEIM
Eddesse
OBERG
MÖLME
BROISTEDT
HOHENASSEL
Ülzen
Lehrte
Verden
Oldenburg
Zwischenahn
Emden
MECKELFELD

FIG. 11

fixed at DM 165 per ton for top quality, an increase of up to 37%, to compensate for higher prices of equipment and higher wages. Producing companies, anticipating that competition against imported oil may become severe, made attempts to cut down exploration and exploitation costs by speeding efficiency.

GEOPHYSICAL OPERATIONS

Following are the number of geophysical crew months of work done in 1948.

Seismic reflection	146
Seismic refraction	11
Gravity meter	21
Torsion balance	5
Magnetometer	—

Fresh impetus was given to seismic reflection work by importing 3 modern American units, 2 of which had been ordered by the Oil Branch, Fuel and Power Division of the Military Government, to carry out a long-range program. The third American reflection outfit was brought in by the parent companies of Brigitta (N.V. de Bataafsche Petroleum Maatschappij (B.P.M.) and Standard Oil Company (N.J.)). Besides the American units, 2 outfits of German design were put in operation. Though German manufacturers are now developing modern reflection seismographs, the number of available instruments is entirely inadequate to study properly all of the prospects. The center of reflection activity was the Emsland, where it has led to the discovery of anticlinal type structures. Other areas under investigation were the Munster basin (Carboniferous prospects and Jurassic-Cretaceous stratigraphic trap possibilities along the northern margin of the basin), Oldenburg, Schleswig-Holstein, and various salt-dome flanks and areas between salt domes in the Hannover district

Refraction shooting was carried out on a short reconnaissance survey in the Molasse basin in Bavaria, southern Germany. Gravity surveys were used on a limited scale only.

CORE-HOLE DRILLING

The use of core-hole drilling has considerably expanded. In northwest Germany, 34 prospects were under investigation, in Emsland, southern Oldenburg, Schleswig-Holstein, and southern Hannover. In Bavaria 2 parties (Brigitta-Elwerath-Wintershall pool and Bayerische Mineral Industrie A.G. (B.M.I.)) were engaged in searching for shallow indications of deep fault zones.

Surface mapping was carried out in the western part of the Molasse basin by Wintershall in preparation for core-hole drilling.

A total of 28,993 meters of core holes were drilled in 1948 (10,416 meters in 1947).

Core-hole drilling on top of the Wesendorf salt dome added a third zone to the existing two deeper ones, when core hole No. 1002 was completed as a producer (7 barrels per day) in basal Lower Cretaceous by the Elwerath-Deutsche Erdol Aktiengesellschaft-(DEA)-Preussag pool. Gas showings were logged in Wealden

beds on the Rautenberg anticline by Elwerath. The broad shallow structure between the Sarstedt-Sehnde and the Molme-Gross-Ilsede salt domes may carry a stratigraphic trap of Wealden beds overlapped by transgressing Valendis.

In the eastern part of the south Germany Munich or Bavarian Molasse basin, 5 counterflush holes were completed in 1948, and near Krumbach, west of Augsburg, 8 such holes were drilled to locate faults indicated by the seismograph refraction work.

EXPLORATION WELLS COMPLETED DURING 1948

No commercial fields of importance have been found in Germany since the discovery of Wesendorf and Hohenassel in the Hannover basin in 1943 and the Georgsdorf and Emlichheim discoveries in the Emsland area near the Dutch border in 1944.

Wildcatting in the Emsland, where east-west trending folds complicated by faulting provide favorable traps, was not fully successful in 1948. Ruhlertwist No. 1 (Wintershall) was located on the eastern extension of the Coevorden-Schoonebeek axis. Valendis sand was found too deep to be oil-bearing. The search for structurally higher positions will be continued. The Itterbeck structure is still waiting for a Zechstein deep test. German operators are reluctant to bring in heavy equipment as long as the Dutch claim on frontier corrections has not been settled. Meanwhile the testing of Lower Cretaceous sands in C. Deilmann's Itterbeck No. 4 had negative results. Though Deilmann-Elwerath's Norddeutschland No. 3 and Salzbergen No. 1 on the Bentheim axis found Zechstein Platten-Dolomit watered, drilling is continued by two outposts (Schuttorf No. 1 and Salzbergen No. 2).

The Oldenburg conces ion (Brigitta-Vacuum) was the scene of an active campaign which included regional seismic reflection, a gravity survey and core-hole drilling. Results of deep drilling on top of the broad interdomal structure of Dangast outlined by seismic reflection were disappointing. Instead of a complete sequence the well found the formational gap (Lower Cretaceous transgressing upon Liassic) which is a common feature on many salt dome flanks in northwest Germany. In the Dangast No. 1 bore hole all possible reservoir rocks had been eroded. Continuing the drilling around the Zwischenahn salt dome, well No. 5 found the porous sandstone in the Valendis that had first been met in No. 3. However, the great depth at which the Valendis sandstone was found (1,680–1,717 m.) below the salt overhang proved to be unfavorable. It is assumed that the Valendis will rise to a higher position on the flank of an interdomal structure northwest of the Zwischenahn salt dome. This type of structure will possibly attract more attention in the future.

In the Hamburg and the Hannover areas a number of salt dome flanks were drilled without encouraging results. Although locations had been chosen far down flank, there were still considerable breaks in the stratigraphical sequence, cutting out potential reservoir rocks. In the Hannover district two interdomal structures,

Stockendrebber and Suderbruch, outlined by seismic reflection, were drilled by Brigitta and Socony-Vacuum. Stockendrebber proved to be dry down to uppermost Jurassic. Suderbruch No. 1 carried showings of light oil in Upper Jurassic limestone which will be tested in 1949. Further evidence that salt domes may rise from areas of pronounced subsidence was given by Hope No. 1 (DEA-Brigitta-Vacuum), which was abandoned at 1979 m. still in Albian beds. Koller's Celle No. 3 was a deep flank test with interesting oil showings in Upper Dogger at 1,625 m. which may lead to more successful drilling higher up. The only successful wildcat completed in 1948 was Elwerath's Stemmerberg No. 4 with 7 barrels per day from the Cornbrash (Upper Dogger), in an overthrust zone. The discovery is credited to surface geology. Tectonics are complicated and future development is not very promising.

In the Gifhorn basin several salt-dome flanks were drilled without success (Schneflingen, Nettgau, Bodenteich). DEA and Vacuum's Hardesse No. 2, on what seemed to be an interdomal structure west of Gifhorn, carried only slight oil showings. Further drilling will explore the possibility of a stratigraphic trap on the edge of the Gifhorn basin. Although Elwerath's Bodenteich No. 4 missed the Dogger beta sandstone either by a fault or by erosion of transgressing Wealden, exploration of this part of the Gifhorn basin and its possible northern extension is considered attractive.

In the Munster coal basin the Ascheberg KMI wildcat, located on the plains south of Munster, was completed in 1948 in the vicinity of an old coal boring which has blown wet gas for some years. The well proved small quantities of gas from fractures in the Upper Cretaceous limestone above the Carboniferous.

STEP-OUT WELLS, INCLUDING WELLS IN NEW ZONES WITHIN OLD FIELDS COMPLETED DURING 1948

To insure a normal development along the Dutch-German border which runs through the Schoonebeek-Emlichheim field, an agreement on the spacing of offset wells was signed between Nederlandse Aardolie Mattschappij and Wintershall in March, 1948.

Emlichheim's step-out Ringe No. 1 was located as an offset to Schoonebeek No. 45 on the Dutch side, but found the top of Valendis (at 888 meters) rather low. Production rapidly went to water and the well was abandoned. On the Adorf structure Adorf Nos. 2 and 3 followed up the discovery well. Drilling results showed an intricate pattern of faults in combination with rapid changes of sedimentation, which may have an adverse effect on further development. Lingen No. 29 may extend the Lingen field in a southwest direction for 1,300 meters, the total proved area of which is now 300 hectares (750 acres). Following the outstanding result of Georgsdorf No. 26, a number of outposts were located on the west plunge of the Georgsdorf axis. Due to a thicker and more permeable pay sand, production per well is higher here than in the eastern part of the field. Step-out well No. 55, 1 kilometer east of No. 26, is now drilling.

In Heide (Schleswig-Holstein) exploration was continued to the north (Hennstedt area), on the barren east flank, and also in a southern direction, where a small production was established by 2 wells near Marne. Development drilling in this area will result in increasing production in 1949.

In the Hannover district none of 7 extension tests were completed successfully. Vacuum-Wintershall's Elite No. 5, following the discovery well No. 4, did not encounter any porous Wealden beds. Further drilling activity was suspended. In Rodewald-Steimbke, attempts to step up production from the Serpulite (late Jurassic) horizon in the north field failed in Brigitta's outposts WA No. 248 and No. 250. Serpulite was either dry or eroded. DEA-Brigitta's Thoren No. 68, located on the south flank of the salt core found no oil in the Wealden and Cornbrash. The Rhetic is here cut out by a fault. Deeper prospects in Vacuum's Hanigsen field were not favorably viewed after Siegfried No. 62 had been abandoned as a dry hole.

METERAGE DRILLED IN GERMANY IN 1945–1948

Year	*Exploitation*	*Extension*	*Wildcat*	*Total*
1945	53,605	7,090	16,426	77,121
1946	46,759	9,737	23,180	79,676
1947	52,448	10,518	42,433	105,399
1948	88,021	22,573	49,110	159,704

NUMBER OF WELLS COMPLETED IN 1945–1948

Year	*Exploitation*		*Extension*		*Wildcat*		*Total*
	Prod.	*Dry*	*Prod.*	*Dry*	*Prod.*	*Dry*	
1945	70	19	—	—	—	15	104
1946	51	31	2	8	2	18	112
1947	58	18	2	8	1	30	117
1948	94	26	2	17	1	41	181

WELLS DRILLING AT END OF 1948

A total of 25 wells were drilling at the end of the year. In the Emsland district Wintershall-DEA-Deilmann's Fehndorf No. 1 penetrated an extraordinary thickness of Upper Cretaceous (about 1,200 meters). At about 1,725 meters Albian was found to overlap Lower Liassic, indicating a Triassic subsurface high which probably extends into Dutch area. Shore-line sands deposited around this high may provide stratigraphic traps. Hebelermeer No. 1 of Vacuum-Schachtbau-Elwerath was a near-miss, showing a loose, fine grained sand (Valendis) poorly impregnated with dead oil. There is only slight evidence that underlying Wealden shell beds may carry oil. Lingen-Muhlgraben No. 1 of Schachtbau-Vacuum-Elwerath is located south of the oil field on a separate structure which had been outlined by seismic reflection and core holes.

In Friesland an interdomal structure is under test east of Barkholt, after drilling on the flank of the salt dome had proved unsuccessful. In the Hannover district tectonics around the Blenhorst salt dome are extremely complicated as

shown again by dry hole No. 26 hitting an overthrust. Elwerath's Hameln No. 2 reached the Middle Zechstein (Upper Permian) at 1,906 m., with 6 m. of Stink Schiefer on top, underlain by 11 meters of Hauptdolomit. A bailing test revealed that the Hauptdolomit was dry.

DEA's Tolz No. 1 is the only active wildcat in the Bavarian Molasse basin. Shortly after the end of 1948 the hole was drilling at 2,190 meters in Promberg beds of upper Oligocene. Below an overthrust at 860 meters it penetrated a rather undisturbed but thick section of Miocene Molasse. Showings have not been reported. All types of exploration have been very restricted in this basin in 1948 as in former years.

About 8 extension wells were drilling at the end of 1948. Lingen A-1 will continue to explore the Aptian reservoir following the successful testing of these beds in Lingen No. 51. Kuhlenberg No. 2 is located close to the old tar seepages to find oil below the Nienhagen-Hanigsen salt-dome overhang. Potential reservoir beds may extend underneath the 600-meter-level galleries of a potassium mine, calling for careful supervision of drilling operations. To find possible east and west extensions of the Hohenassel field, where pre-Cretaceous faults may have formed separate traps, Elwerath-Preussag and Braunschweigische Bohrgesellschaft's Hohenassel W-1 and Luttrum No. 4 were drilling west of the field. Osterlinde No. 1, east of the Hohenassel field, was a failure.

CHANGES IN CONCESSION HOLDINGS

In northwest Germany only minor changes of holdings occurred as the present system of allocation by the Government has created a rather stabilized situation. In Bavaria various major oil companies have applied for State concessions in the Molasse basin.

PRODUCTION

The accompanying table of crude-oil production brings out the growing importance of the Emsland fields. Their share of total German production rose from 5.5% in 1945 to 25% in 1948. Georgsdorf showed an increase of 113% over 1947. The Emsland output in 1949 is estimated at 242,000 tons (1/3 of German production). Neither in Georgsdorf nor in Lingen has the edge-water line been encountered up to now.

Estimates of proved and probable reserves are the following.

	Million Cubic Meters	*Million Barrels*
Lingen	1.8	13.5
Emlichheim	2.0–3.0	15.0–22.5
Georgsdorf	3.0–4.0	22.5–30.0

The bulk of the Hamburg district's production came from the Reitbrook field where the steep decline curve after 1940 has been flattened by secondary recovery and a small production from lower Eocene sand. Drilling of the Eocene continues on a limited scale. After having tested gas showings in Zechstein (final

depth 3,053.5 meters) with negative result, the deep test, T-4, was completed as a producer from Senonian beds.

In the Hannover district development of the lesser fields was just able to counterbalance the decline of the Nienhagen field (maximum 358,190 tons in 1938). The increase at Hademstorf is accounted for by a higher block, where upper Wealden with good oil sands had been preserved. The extension of this block is limited, however. The sharp decrease in Hohenassel in 1947 was due to a heavy drop in bottom-hole pressure; wells were choked down and repressuring was started. Wesendorf is the outstanding field of the Gifhorn basin with production found around the south and east flanks of the dome. With additional production from the Lower Cretaceous on top of the dome, Wesendorf will show a larger output next year. The prospects of the two fields in the Upper Rhein Graben do not look encouraging. The productive blocks have been drilled and estimates on reserves are low.

Though the extent of German reserves proved by lateral extensions of old fields can not be fully estimated, it appears that they exceed in amount the production in 1948.

PRODUCING FORMATIONS AND THEIR SHARE OF PRODUCTION IN 1948

	Percentage
Tertiary	1.52
Cretaceous	64.84
Jurassic	29.87
Upper Triassic	1.73
Upper Permian	2.04
	100.00

Cumulative production of Germany to the end of 1948 amounted to 12,364,042 tons or approximately 92,635,000 barrels.

NATURAL-GAS PRODUCTION

Bentheim is the only gas field in Germany. Gas is produced by 2 wells from upper Zechstein dolomite. The production has been fixed at a rate of 20 million cubic meters (706 million cubic feet) per atmosphere drop in formation pressure. This production rate amounts to 10–15% of the open-hole potential. The gas is piped to Chemische Werke at Huels in the Ruhr area.

Summarizing the position on the German crude-oil output, it can be stated that in 1948 the decline in the Hannover, Schleswig-Holstein, and Hamburg districts was more than offset by an increase in the Emsland fields. Although these conditions may continue for a couple of years to come, the discovery of new fields nevertheless becomes imperative to keep the industry going. There is a feeling of cautious optimism among German geologists that they will meet the challenge.

Through reconstruction, refinery capacity increased from an annual capacity of 9,750,000 barrels in 1947 to 19,500,000 barrels in 1948.

German Crude Oil Production in Metric Tons[a] 1945 - 1948

	1945[b]	1946	1947	1948	Producing horizons
Emsland					
Adorf	-	-	-	2,163	Wealden
Emlichheim	5,141	24,123	51,996	64,850	Valendis
Georgsdorf	9,269	14,897	24,170	53,096	Valendis
Lingen	16,255	40,709	37,901	47,738	Wealden
	30,665	79,729	114,067	167,847	
Friesland					
Etzel	1,821	4,719	4,172	4,433	Dogger
Hamburg					
Meckelfeld	2,326	2,665	1,940	2,121	Senonian, Lower Cretaceous
Reitbrook	34,471	34,274	34,591	38,443	Senonian, Eocene
	36,797	36,939	36,531	40,564	
Schleswig-Holstein					
Heide	90,569	74,364	56,114	50,703	Zechstein, Lower Cretaceous
Hannover					
Broistedt	1,614	2,547	2,862	4,063	Wealden
Eicklingen-Wienhausen	13,530	14,509	13,535	13,044	Wealden, Valendis
Eilte	-	-	86	244	Wealden
Fuhrberg-Hambuhren	33,866	51,084	42,437	47,744	Cornbrash (Upper Dogger)
Hademstorf	4,108	6,704	5,684	9,417	Wealden
Haenigsen	35,146	37,553	31,670	32,475	Valendis, Wealden
Hohenassel	31,534	48,642	19,941	18,807	Corallian
Molme	7,766	7,158	4,929	4,733	Rhetic, Wealden, Corallian
Nienhagen	131,765	129,957	102,833	91,928	Valendis, Wealden, Cornbrash
Oberg	8,265	9,497	5,654	5,681	Dogger, Wealden
Olheim-Eddesse	2,960	3,014	2,643	2,350	Rhetic
Rodewald-Steimbke	23,572	46,182	41,474	41,550	Cornbrash, Serpulite, Wealden
Stemmerberg	-	-	-	102	Cornbrash
Thoren	16,039	19,212	17,225	17,210	Wealden, Rhetic, Cornbrash, Corallian
Wietze	19,931	22,356	21,327	23,055	Wealden, Rhetic, Dogger, Senonian
	330,096	398,415	312,300	312,403	
Gifhorn					
Calberlah	152	557	395	447	Dogger beta
Ehra	44	571	647	612	Dogger beta
Gifhorn	1,702	2,129	1,530	1,305	Wealden
Wesendorf	51,418	45,706	44,586	50,886	Dogger, Liassic, Lower Cretaceous
	53,316	48,963	47,158	53,250	
Upper Rhein-Graben					
Weingarten	1,204	2,711	2,028	2,080	Oligocene
Forst-Weiher	2,973	4,071	4,247	3,960	Keuper, Oligocene
	4,177	6,782	6,275	6,040	
Grand Total	547,441	649,711	576,617	635,240	
Daily Average:	1,500	1,780	1,580	1,740	(approx. 13,000 bbls.)

(a) One metric ton equals roughly 7.5 bbls. more or less depending on the oil gravity.
(b) Wells were closed in on all fields for 2 to 4 weeks on account of the Allied invasion.

German Gas Production in Thousands of Cubic Feet

Bentheim	2,508,175	3,755,995	2,528,938	2,132,406	Zechstein
Casing head gas from 8 lesser fields	301,936	297,840	214,332	239,543	
	2,810,111	4,053,835	2,743,270	2,371,949	

AUSTRIA

Crude-oil production in Austria during 1948 is estimated at 907,840 metric tons (6,173,300 barrels) or 16,870 barrels daily. Thus production was essentially at the same level as in 1947. Although the figures given are necessarily estimates because of the unavailability of precise figures for production from the Soviet-controlled fields, there is a sufficient amount of control data to insure that the figures given are fairly accurate. Cumulative production in Austria to the close of 1948 was approximately 53,353,000 barrels.

The normal decline of production from the older Austrian oil fields, which are drilled up, was offset by the opening of cased-off strata, and by active new drilling in the Muhlberg field and its eastern extension, where the Soviets completed 6 new producing wells during the year. Overproduction in some fields has caused considerable water coning. The distribution of 1948 crude-oil production among the various fields is approximately as follows.

	Estimated 1948 Production		
	Metric Tons	*Barrels*	*Bbls. Daily*
Gaiselberg	166,480	1,047,160	2,860
R.A.G.	33,296	209,430	570
Gosting	102,052	641,910	1,750
Van Sickle	58,811	369,920	1,010
Hauskirchen	225,630	1,419,210	3,880
Muhlberg	289,270	1,819,510	4,970
St. Ulrich	17,813	112,040	310
Scharfeneck	42	260	1
Maustrenk	12,144	76,390	210
Hohenruppersdorf	2,302	14,480	40

Five wildcat tests were completed in the Vienna basin during 1948. All of these were drilled by the Soviet Oil Administration. Of these deep tests, three were dry holes which brought no important new information. A fourth well, drilled on an anticline or dome at Matzen, in the central part of the Vienna basin about 20 miles northeast of Vienna, encountered very good oil showings in the productive Sarmat horizon, but was junked before these could be tested. A further test on the Matzen structure, at a location known as Ernestinenhof, encountered gas under high pressure in the lower Pannonian strata just above the Sarmat horizon. The well was not equipped with a blow-out preventor, and the gas erupted in such volume and force as to create a crater which completely buried the rig and derrick. Within a few days, the well site was marked only by a pond about 100 feet in diameter, through which gas still bubbled. The Soviet Oil Administration thereafter moved three heavy-duty rigs onto the Matzen structure and at year's end one of these was drilling into the Pannonian gas horizon. Nearly 30 rigs were operating, mainly on exploitation drilling in 1948, and 35–40 wells were completed during the year.

During 1948, the Soviets abandoned their core-drilling campaign in the Burgenland district of southeastern Austria, having found no satisfactory conditions for oil accumulation. The core-drilling equipment was transferred to the

outskirts of the city of Vienna, and began efforts to trace fault lines suspected to exist in this area.

In the U.S. zone of Upper Austria, the Rohoelgewinnungs, A. G. began geological mapping and core-holing in the Alpine foreland, marking the first exploration efforts in western Austria since the close of the war.

Hungary

In September, 1948, the oil fields of the Maort (Hungarian-American Oil Industrial Company, a Standard Oil Company (N.J.) affiliate) were completely taken over by the Hungarian Government, and oil production and operation data were declared confidential in Hungary. Consequently, the data here given are partly estimated. However, it is believed that they do not vary essentially from the actual figures.

Crude Production
Maort Fields

Field	Production (Barrels) Total	Daily
Budafapuszta	1,097,000	3,000
Lovaszi	2,146,000	5,860
Hahot	337,000	920
Totals	3,580,000	9,780

With the exception of the insignificant Government Bukkszek field, this tabulation comprises the entire oil production in Hungary, which constitutes a decrease of about 17% from that of 1947. This decrease is mainly due to the natural decline of the fields, accentuated by the forced production imposed on Maort by the Hungarian Government.

Although the Budafapuszta and Lovaszi fields were all drilled according to a reasonable well-spacing plan, new wells were interpolated to augment production. In the Budafapuszta field four, and in the Lovaszi field nine, new productive wells were completed in 1948.

In the western part of the Hahot structure, a semi-wildcat was completed on a secondary gravity closure. This well produced about 35 barrels of oil daily. A gas well was completed in the Hahot-Ederics gas field with an initial production of 5 million cubic feet of wet gas per day and some condensate. Six other wells in the Hahot area were failures.

Three wells completed at Vetyem (east of Lovaszi) on the Budafapuszta anticline were (except for some gas and a showing of oil) unsuccessful.

A test well on the gravity maximum at Salomvar (northwest of Hahot) was drilled without success, and the test drilled at Nadasd (north of Salomvar), a geophysical prospect, is also a dry hole.

Two more holes were completed on the Inke structure (east of Budafapuszta) but both were dry. To date, 8 tests have been drilled on the Inke prospect—a buried-hill structure. The first of these has an initial production of about 3 million cubic feet of gas daily containing over 30% carbon dioxide and some distillate. The remainder were dry holes.

SUMMARY OF MAORT COMPLETIONS, 1948

Area	*Oil Wells*	*Gas Wells*	*Dry Holes*	*Drlg. or Testing 12/31/48*	*Total*
			EXPLOITATION		
Budafapuszta	4	—	—	1	5
Lovaszi	9	—	—	4	13
Hahot	1	1	6	7	15
Totals	14	1	6	12	33
			EXPLORATION		
Vetyem	—	1	2	—	3
Inke	—	—	2	—	2
Salomvar	—	—	1	—	1
Nadasd	—	—	1	—	1
Totals	—	1	6	—	7
Grand totals	14	2	12	12	40

A gravity-meter party made detailed surveys on the Budafapuszta and Hahot structures, working throughout the year, and in the second half of the year a torsion balance party started field work in southwest Hungary.

No definite news could be obtained on the activities of the Masovol (Hungarian Soviet Oil Company) though drilling and geophysical surveying was carried on within its concession covering most of the Great Hungarian Plains.

YUGOSLAVIA

Yugoslavia has been striving to expand its small crude-oil production as a part of its current (1947–1951) 5-year plan. Output reached a peak of about 2,000 barrels per day in 1944 during the period of German occupation, and was reported to have been running at the rate of 1,100 barrels daily in early 1948. The target set for the year 1951 under the current 5-year plan is 450,000 metric tons (3,375,000 barrels) or 9,250 barrels daily. Production in 1938 and 1939 was at the rate of about 20 barrels daily. Cumulative production totals about 3,105,000 barrels.

Production is mainly from the Lendva district of northwestern Yugoslavia, with probably small amounts from the old Peklenicza and Selnica fields and possibly other areas at the southeast toward Goilo. These areas all lie north of the Sava River along the Hungarian frontier. The producing fields named lie on a western extension of the anticlinal structure trend of Budafapuszta or Lispe, on which the fields in Hungary are situated.

To handle the increase in production envisaged by the 5-year plan, a new refinery, with cracking facilities and a capacity of 300,000 tons annually (6,150 barrels daily), is said to be scheduled for completion early in 1950. There is no information to the effect that the increase in production planned will materialize. Imports into Yugoslavia immediately prior to the war were at the rate of about one million barrels of crude and 140,000 barrels of products annually.

Czechoslovakia

Almost no information is available on developments in this country over the past year. A new discovery was reported by the Ministry of Industry to have been made near the Hodonin field in southern Moravia during the first half of 1948. Daily production for the country is believed to have been at a rate of about 500 barrels daily. Cumulative production totals approximately 4,290,000 barrels.

Poland

The incorporation of eastern Poland, with its old and famous Galican oil fields, into the Soviet Union at the close of the war meant a loss of 75% of Poland's production to Russia. Prior to the war, Poland exported 40% of its oil output. Today she must import twice as much as she produces. Production in 1948 is reported to have been at the rate of approximately 3,000 barrels daily, up about 13% from that of 1947. Cumulative production totals about 269,481,000 barrels for pre-war Poland through 1940 plus subsequent production applicable to Poland of today. Gas production totaled about 5,000,000,000 cubic feet or 14,000,000 cubic feet daily in 1948.

Reports indicate a considerable increase in drilling in 1948 as compared with 1947. All producing and exploration activities are controlled by the Central Board for the Liquid Fuel Industry, which has a number of subsidiary departments.

During the war the Germans built three large plants for synthetic production of gasoline and other products from Polish coal. These plants were dismantled by the Russians for reparations in 1945. However, a Fischer-Tropsch synthetic gasoline plant was later moved from Dresden, Germany to Poland, and this plant, operating on Silesian coal, was scheduled to start operations in 1948. The plant is said to have a capacity of about 500 barrels of synthetic gasoline daily. The erection of other plants is said to be planned.

Rumania

On June 11, 1948, Rumania nationalized the more important industries, including the oil industry. In February, 1948, the only statistical publication covering the oil industry, ***Moniteur du Petrole Roumain***, was discontinued, while the Association of Rumanian Oil Industrialists (AIPR), another agency supplying statistics, has been laboring under a cloud as a reactionary organization, until it was dissolved shortly after the nationalization. Under such circumstances, it became increasingly difficult to obtain reliable statistics covering the oil industry. It was known, however, that total crude production increased from 78,600 barrels daily in January, 1948, to 83,200 barrels daily in April, 1948. The Rumanian Government claimed important increases after nationalization without, however, publishing any figures. Taking as a basis the April, 1948 figure (83,200 b/d), total production for 1948 may be estimated at 30,368,000

barrels, representing an increase of about 1,596,000 barrels or roughly 5% over 1947. Cumulative production to the end of 1948 on this basis, totaled about 1,202,586,000 barrels. The 1948 program of the government called for a production of 33,000,000 barrels and it may well be that under the pressure of Russia, this goal was reached.

As regards drilling activity, the 1948 program set the figure at 1,115,500 feet which is about double the 1947 footage. On the basis of footage drilled in April, 1948 (91,118 feet), the total drilled during last year may be estimated at 1,094,000 feet or fairly close to the goal set by the program. The Rumanian Government claimed for June, 1948, i.e. after nationalization, that the larger companies exceeded the drilling program by more than 150%.

The government's program also called for the drilling of 210 wells of which 60 would be wildcats, programmed in such a way as to cover practically all of Rumania. This is more than three times the number of wells drilled during 1947. It is not known whether this program was carried out, but due to scarcity of material and the bad condition of the drilling equipment, it seems doubtful.

Export figures for 1948 are not available but it may be mentioned that during 1947 about 95% (14,066,000 barrels) of the total exports went to the Soviet Union for reparations under the Commercial Agreement. Last year brought with it greatly increased Government control of the oil industry which culminated in the nationalization in June, 1948. This was accomplished by an avalanche of decrees which placed the companies and their managements practically at the mercy of the government. Leading oil men were either arrested and/or charged with sabotage, *et cetera*, or fled the country to escape persecution. The enterprise committees (Labor Union) became more and more aggressive, frequently interfering in management's affairs. All the important companies with foreign capital were placed under Government administrators without whose approval the managements could not take any important steps. In April, 1948, all companies were forced to deliver on 48 hours notice to the Institute of Geology, all their geologic and geophysical maps, reports, *et cetera*, for study by a Russian Commission invited to the country for the rehabilitation of the oil industry. After nationalization the Government centralized the oil industry under two petroleum centers, "Muntenia" and "Moldova," while domestic sales were centralized under "Competrol" and exports under "Petrolexport."

The nationalization law is highly discriminatory in that it left the "Sovrompetrol" group (Russian and Rumanian interest) untouched and its provisions are such that practically it means expropriation without compensation. The United States Government, along with other interested powers, has not recognized the legality of the nationalization law, and in a note under date of September 7, 1948, reserved "all rights on behalf of its Nationals with respect to the seizure of their properties by the Rumanian Government and intends to hold the Rumanian Government responsible for the return of the properties or prompt payment of adequate and effective compensation therefor."

RUSSIA

A year ago the writer presented a general perspective and analysis of developments in the Russian oil industry since the war, and their relation to pre-war and to the current 5-year plan. There is little information on developments during the past year, and none of this materially changes the picture and trend reported a year ago.

Accurate figures on production in Russia and Sakhalin are unavailable. Official references to industrial output of all kinds in Russia customarily do not give figures. Rather, they report activities or output in terms of percentages of those of the previous year, or degree of fulfillment with respect to the 5-year plan. Therefore, any figures of actual output must necessarily be only rough estimates. Furthermore, some of the reports issued state that the percentages are based on the value rather than on the quantity of the output.

One statement, in which percentages were said to be based on value, reported output of petroleum in 1948 as 113% of that for 1947. Another statement released by the Soviet Embassy in Washington and reported in the press maintained that third-quarter crude-oil and gas production in 1948 were 109% and 103%, respectively, of that in the same period in 1947. The statement indicated that the greater increases in production were in the eastern areas, probably meaning the more newly developed fields of the Ural-Volga region, and that lesser increases were accomplished in the southern and western areas, which presumably refer to the old producing fields of the northern and eastern Caucasus. The same sources have stated that the amount of drilling in 1948 was 28% above that of 1947.

Last year we reported a figure of 525,000 barrels daily production for the year 1947. Study of later reports suggested that this figure may have been somewhat on the low side. After making what appears to be an adequately large correction of our figure for 1947 and giving full value to the increase in 1948 as reported by Soviet sources, we conclude that production in Russia, including Sakhalin, approximated 600,000 barrels daily. Such an output is in line with other estimates that we have seen, as well as with the degree of progress which the Russians report toward attaining their announced goal of 700,000 barrels daily production in the year 1950.

We have nothing to add to the picture as reported last year on the distribution of effort and success as determined by production increases. These increases appear to be most rapid in the newer Paleozoic field areas of the Ural-Volga region. The old Tertiary fields of the Greater Baku region near the Caspian and westward along the Caucasus front, while still accounting for the major part of Russian production, seem to be doing little more than maintaining a level of output that is considerably below that of pre-war and very little above the low ebb reached at the close of the war.

A daily production of 600,000 barrels in 1948 is approximately 45% of that of Venezuela and about 51% of that of the Middle East. In addition to the production within the present Russian borders, consumption demands of the country

called for a large part of the 110,000 barrels daily production of Rumania, Austria, and Hungary, which has been drawn upon as part of reparations payment to Russia.

In our review of a year ago we speculated on what the Russian proved reserves might be. Although we showed Russia with a proved reserve of 5 billion barrels, we pointed out that, if annual production was about the same percentage of proved reserves as in the United States, the Russian proved reserves would be something like 2.5 billion barrels. This might even be considered an overly large estimate if the Russian practice of over-production in the fields which they have taken over in eastern Europe is any measure of the practice in their own fields.

Italy

Italy's petroleum production has seen a further decrease during 1948 and no new oil discoveries have been recorded. The total oil production for 1948 as estimated on the basis of official figures for the first 11 months was 9,236 metric tons (64,650 barrels) or 177 barrels per day, approximately 13.5% below 1947. Cumulative oil production in Italy totals about 3,391,000 barrels.

Gas production, however, has been increased, to continue an over-all trend that has been going on since prior to the war, and which was greatly spurred by the exigencies of the war. Total 1948 gas production is estimated at 130,000,000 cubic meters (4.6 billion cubic feet). This estimate is somewhat higher than the official figures of approximately 103,000,000 cubic meters, which for some reason do not include all of the actual gas production. Since so much effort has been put into development of the shallow Quaternary and late Tertiary gas accumulations by the Italians in the Po delta and valley area in recent years, and since so little has been accomplished in the way of explorations for oil, we shall review the activities of the past year in the search for gas.

The 1948 increase in gas production resulted not only from new discoveries and greater development of gas fields, but also because of a better outlet for the gas. A 6-inch and 7-inch gas line now connects Azienda Generale Italiana Petroli's (AGIP, a State controlled company) Caviaga (Lodi) field in the western Po valley, with the Dalamine steel mills southwest of the town of Bergamo. Other pipelines were under construction at the close of the 1948 year. One of these is a 10-inch and 7-inch line between Contarino (Po delta) and Mestre (industrial area of Venice).

The greatest gas production from a single field is that of the Caviaga (Lodi) field of Azienda Generale Italiana Petroli, which in December, 1948, had a record output of 3,257,000 cubic meters (114,972,000 cubic feet) from 6 producing wells. Except for this figure, which is for only one month, we have no accurate production data on single fields outside of those of the Societa Petrolifera Italiana (partly owned by the Standard Oil Company (N.J.)). It is evident, nevertheless, that less than half of Italy's gas production comes from the western part of the Po valley basin (provinces of Milan, Piacenza, and Parma). This production,

which is partly wet gas, comes from the Tertiary formations: Pliocene, Miocene, Oligocene. More than half of the gas production is still attributed to the eastern part of the Po valley (provinces of Rovigo, Ferrara, Venice), where the dry or methane gas is produced almost exclusively from Quaternary deposits which attain a great thickness.

Recent discoveries, however, indicate that the greatest part of Italy's gas production will eventually come from Tertiary formations, particularly from the Messinian series, which is of early Pliocene or late Miocene age. The Quaternary gas is usually associated with fresh and salt water and is produced together with the water.

Wildcat and production drilling together with general exploratory activity slowed considerably in Italy during 1948, because the various companies interested in the development, particularly of northern Italy, were still waiting for the amendment of the mining law.

Societa Petrolifera Italiana drilled 10,642 feet (3,243 meters) of wildcat and stratigraphical hole in 3 wells on a comparatively small permit holding near Ferrara, eastern Po plains in 1948.

Azienda Generale Italiana Petroli (A.G.I.P.), favored by larger exploration permit holdings, has further developed its Caviaga (Lodi) gas field and has endeavored to explore the section to depths beyond 2,000 meters (6,500 feet). The wildcat well of Ripalta, north of the Lodi structure, has discovered what may turn out to be a new and important gas field, and further drilling in that vicinity was under way at the end of 1948.

Two other important wildcats, still in course of drilling, are located on the Pontenure-Cortemaggiore structure in the Province of Piacenza (about 13 miles east-southeast of Piacenza). These wells have ascertained the presence of important gas deposits in the Messinian series. It is of interest to mention that Lodi, Ripalta, and Cortemaggiore are seismic discoveries.

There was only a small amount of surface geologic activity in 1948, most of which was in northern Italy and the balance in Sicily. More important was the seismic exploration carried out by S.P.I., A.G.I.P., and by several small companies with experimental equipment. The number of crew months total about 30. Gravimetric work was carried on by several companies, and is estimated at 6–10 party months. The telluric-current survey method, executed by the Société Generale de Geophysique of Paris, was tried for the first time in Italy by two companies in the eastern Po plains.

Leasing activity was almost entirely suspended during the year although several companies have, since 1947, filed applications for blocks of land in the Po Valley, in the Adriatic coastal area south of Pesaro and Ancona, and in Sicily.

Spain

Geological and geophysical study and drilling activity on a modest scale were continued throughout the year by both state and private companies. Most active

have been Campsa (Spanish Government petroleum monopoly), Ciepsa (50% each Socony-Vacuum and Cepsa, a private Spanish Company) and Adaro, a government organization which operates the mineral industries in Spain.

The exploratory well of Ciepsa, which we reported last year as drilling on the large Oliana (Lerida) structure in northeastern Spain, was abandoned as a dry hole at close to 2,500 meters depth, having drilled in Eocene strata throughout. The rig was moved to Burgo de Osma (Soria) in north-central Spain where in December, 1948, a well was spudded on a domal anticline in Upper Cretaceous limestones.

Farther north in north-central Spain, about 90 kilometers north of the city of Burgos, Campsa continued drilling on a large, rather deeply eroded anticline in the Zamanzas valley. Minor oil shows of no commercial value have been obtained there in Jurassic limestones and calcareous shales. Preparations are being made to erect a new rig, recently acquired, on a similar structure near Villanueva de Rampalay (Burgos).

Empresa Adaro continued its slow drilling in Keuper at shallow depth with an old light rig near Chiclano de la Frontera south of Cadiz in the Seville-Cadiz basin of southwest Spain. Minor amounts of gas were obtained at a depth of about 150 meters. Difficulties have forced suspension of operations, and modernization and reorganization of the rig are being attempted.

Geological activity over the past year has been largely concentrated in northern, principally north-central, Spain where stratigraphy and structure are rather well exposed. A small amount of electrical prospecting has been done by technical personnel of the Instituto Nacional de Geofisica.

Portugal

The only exploratory activites in Portugal are being carried on by the Compania Portugueza do Petroleo (combination of the Axel Johnson Shipping interests of Sweden and the Portugese Government).

Three geological parties were active in the country at the close of 1948. The first of these began work in July, 1947, the second in December, 1947, and the third in mid-1948. Therefore, the amount of geologic work in 1948 totaled approximately 30 party months. There was no geophysical activity.

The sedimentary basins of Portugal are restricted to small areas near Lisbon and in the southern part of Portugal. The sediments in which there may be very moderate prospects for oil or gas range from Lower Tertiary to Jurassic in age. In the past some shallow drilling has been done in the Torres Vedras area about 25 miles northwest of Lisbon where non-commercial oil showings were obtained. There was no drilling in 1948.

Spanish Morocco

Two Spanish Government companies—I.N.I. and E.M.A.—were active in Spanish Morocco during 1948. The exploratory work consisted of surface geology,

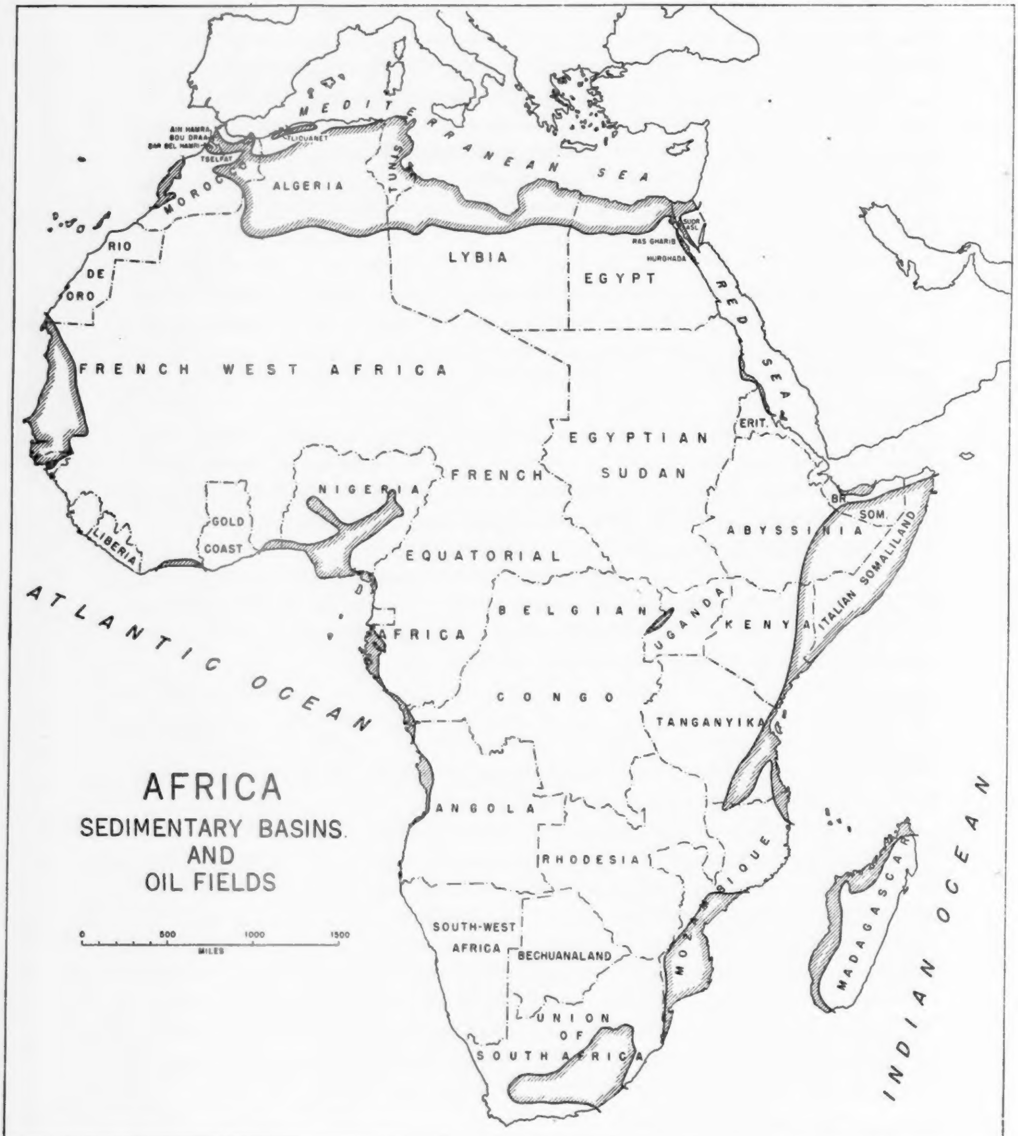

AFRICA
SEDIMENTARY BASINS AND OIL FIELDS
0 500 1000 1500
MILES
MEDITERRANEAN SEA
ATLANTIC OCEAN
INDIAN OCEAN
RED SEA
AIN HAMRA
BOU DRAA
TSELFAT
TLIOUANET
RAS GHARIB
HURGHADA
MOROCCO
ALGERIA
TUNIS
RIO DE ORO
LYBIA
EGYPT
FRENCH WEST AFRICA
EGYPTIAN SUDAN
ERIT.
NIGERIA
GOLD COAST
LIBERIA
FRENCH EQUATORIAL AFRICA
ABYSSINIA
SOM.
ITALIAN SOMALILAND
BELGIAN CONGO
UGANDA
KENYA
TANGANYIKA
ANGOLA
RHODESIA
MOZAMBIQUE
MADAGASCAR
SOUTH-WEST AFRICA
BECHUANALAND
UNION OF SOUTH AFRICA

FIG. 12

shallow drilling, and gravimetric and seismic surveys. Seven shallow wells, none of which reached a depth of 500 meters, have been drilled to date to ascertain the disposition of Cretaceous and Tertiary strata on the flanks of Triassic diapiric structures. One of these encountered wet gas at three horizons with pressures of 15, 20, and 30 atmospheres, respectively. Salt water and/or minor amounts of gas were encountered in some of the other holes.

French Morocco

The Government-controlled company (S.C.P.), Société Cherifienne des Pétroles, was the only organization effectively engaged in the search for oil in French Morocco in 1948. The amount of geological and geophysical work done during the year was as follows.

Geological Party Months	*Geophysical Party Months*	
	Seismic	—12
	Magnetic	—12
56½	Telluric	—12
	Gravimetric	—12
	Electric	— 7

No exploitation wells were completed during 1948, but about 55 exploration wells, including four structure core holes, were completed during the year, for a total footage of 174,552 feet.

Five wildcat wells were drilling at the end of the year 1948. All of these are located in the Rharb plain (the northern Mio-Pliocene basin area of Morocco) centering around Petitjean where a discovery was made during the year.

The Société Cherifienne des Pétroles remained the only oil company interested in concession holdings in Morocco during 1948. This company asked for and was granted 329 petroleum exploration permits, and increased its holdings by 5,264 hectares (13,370 acres) during 1948.

Production, in 1948 all by the Société Cherifienne des Pétroles, was as follows.

Field	*1947*		*1948*	
	Metric Tons	*Bbls.*	*Metric Tons*	*Bbls.*
Tselfat	511	3,577	133	931
Bou Draa	722	5,054	217	1,519
Ain Hamra	770	5,390	722	5,054
Oued Beth	764	5,348	11,844	82,908
Total	2,767	19,369	12,916	90,412

Daily production in 1948 thus averaged about 24.7 barrels. It will be noted that Moroccan production has very largely increased during 1948, in spite of a decrease in the old producing fields of Tselfat, Bou Draa, and Ain Hamra. The increase is entirely due to new discoveries in the Oued Beth area, where at least three wells (out of 41 drilled) are reputedly capable of producing 400 barrels each per day. This production is not in full use due to lack of transportation and refining facilities.

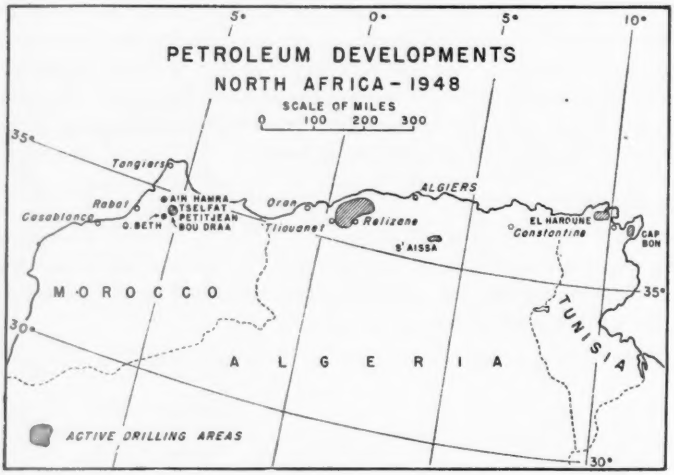


FIG. 13

ALGERIA

The Government company (S.N. REPAL), Société Nationale de Recherches et d'Exploitation Pétroliferes en Algérie, was the only organization effectively engaged in the search for oil in Algeria in 1948. During the year this company did 108 party months of geologic field work and one crew month of gravimetric work.

Fifteen wells, some of which were structure core holes, were completed in 1948. A total of 38,216 feet of hole was drilled during the year. Four wildcat wells were drilling at the end of the year. Three of these are in the Chelif basin (Mio-Pliocene coastal plains of northern Algeria), and one is at Sidi Aissa (northern margin of the Mediterranean Atlas). The wells in the Chelif basin, in which all of the completed wildcat wells were drilled in 1948, have as an objective the basal Miocene conglomerates and sands. During the past year this formation was found too tight to produce, although several oil and gas showings were encountered.

No significant changes in concession holdings took place in Algeria during 1948, except that the Government-controlled company, the S.N. REPAL, considerably increased its acreage of exploration permit applications in order to keep pace with its aggressive program of oil search in Algeria.

Total production from the old oil field of Tliouanet, operated by the S.N. REPAL in the Chelif basin, was 756 barrels in the year 1948, an average of only about 2 barrels daily.

TUNISIA

The Government company (SEREPT), Syndicat d'Etudes et de Recherches Pétrolieres en Tunisie, was the only organization effectively engaged in the search

for oil in Tunisia during 1948. This company did 40 party months of geologic work, 2 of telluric-current study, and 11 party months of gravimetric work during the year.

There were no well completions in 1948. Two wildcat wells were drilling at the end of the year, when their status was as follows.

El Haroun Well No. 2.—Depth at the end of 1948: 2,856 meters (9,370 feet). Spudded in late 1947 in the region of Ferryville (North Coastal Plains of Tunisia). This well is scheduled to test the oil possibilities of the Campanian (Upper Cretaceous), after checking oil showings found in the Paleocene by the first well, which was drilled in 1938–1940. The Campanian had not been reached at the end of 1948.

Cape Bon Well No. 1.—Depth at the end of 1948: 2,280 meters (7,480 feet). The well was spudded in late February, 1948, on the Cape Bon Peninsula, which became famous during the last war as Field Marshal Rommel's last retreating ground from North Africa.

At the depth of 7,480 feet this well was in marls with chert bands which are thought to be Barremian (Lower Cretaceous) in age. Oil and gas indications have been met confirming those of a well drilled by the Standard Oil Company in 1924–1926 which was 400 meters away from the present location but which had only reached a depth of 5,050 feet.

The drilling objective of the present well is to test the oil possibilities of the Lower Cretaceous and, if reachable by the drill, the upper part of the Jurassic.

No significant changes in concession holdings took place in Tunisia during 1948, but permit applications were submitted by the Shell, the Gulf, and Standard Oil (N.J.).

At the year's end it was officially published in the local press that large concessions were being granted to both Shell and Gulf in partnership with the local Government-controlled company the SEREPT (Syndicat d'Etudes et de Recherches Pétrolieres en Tunisie).

To date Tunisia has no commercial production of oil or gas.

Nigeria (including Cameroons under British Trusteeship)

During 1948, Shell-D'Arcy exploration parties continued the exploration work reported last year. The work was carried on in the eastern provinces. Geologic, seismic, and gravimetric parties were in the field during a large part of the year.

French Equatorial Africa

The French Government carried on exploratory work in French Equatorial Africa in line with her current plan to develop the oil possibilities of the various colonies along with those of France. In 1948, 25 party months of geologic work, and 8 crew months each of gravity and magnetic studies were done. In addition, one exploration well was completed in 1948 and one well was drilling at the close of the year. This activity is reported to be at Mabora in Gabon.

Angola

All operations in search of crude oil in Angola to date were carried out by the old Companhia dos Petroleos de Angola. Wells drilled in the period of their activity 1922–1936, logged only small amounts of heavy oil.

Since the beginning of 1946, Companhia dos Betuminosos de Angola has been investigating solid and semi-solid bitumens of the Cretaceous-Tertiary of this Portuguese colony. They are at present investigating deposits of asphaltic limestones in the neighborhood of Luanda, Caxito region, and "asphaltic coals" (libolites) in Quilungo and Calucala. Attempts, still in a preliminary stage, are being made to distill these materials with a view to industrial utilization of the distillation and residue products.

Mozambique, Portuguese East Africa

An oil concession was granted by the Portuguese Government on May 7, 1948, to the Mozambique Gulf Oil Company, covering an area of 46,100 square miles in the Province of Sul do Save in the southern part of Mozambique. It is reported that in return for various customs and tax exemptions, the Government will hold a large minority interest in the company.

During 1948 an airborne magnetometer survey was carried on for 3 months, and will be completed in 1949. Geological field work, which totaled 2 party months in 1948, will also be continued through 1949. In addition, a gravimeter party is scheduled to start work in 1949.

Madagascar

On the large island of Madagascar the French Government did 31 geologic party months of geologic work, 16 crew months of gravimetric, and 8 crew months of magnetic work during 1948. There was no drilling or other activity.

Ethiopia

After a shut-down period due to tribal disturbances, the Sinclair Petroleum Company resumed operations in Ethiopia during the latter part of 1948. Several exploration parties are now in the field mapping and doing surface geology, and stratigraphic drilling and a deep well will probably be commenced some time before mid-year 1949.

Egypt

Production of about 13,153,000 barrels (35,950 b/d) in 1948 represented an approximate 40% increase over 1947. The production trend during the last few years has been rather steadily upward. With the intensive exploration and exploitation activities in the Gulf of Suez region, this trend will probably continue for the immediate future at least.

Production for the year as compared with 1947 was as follows.

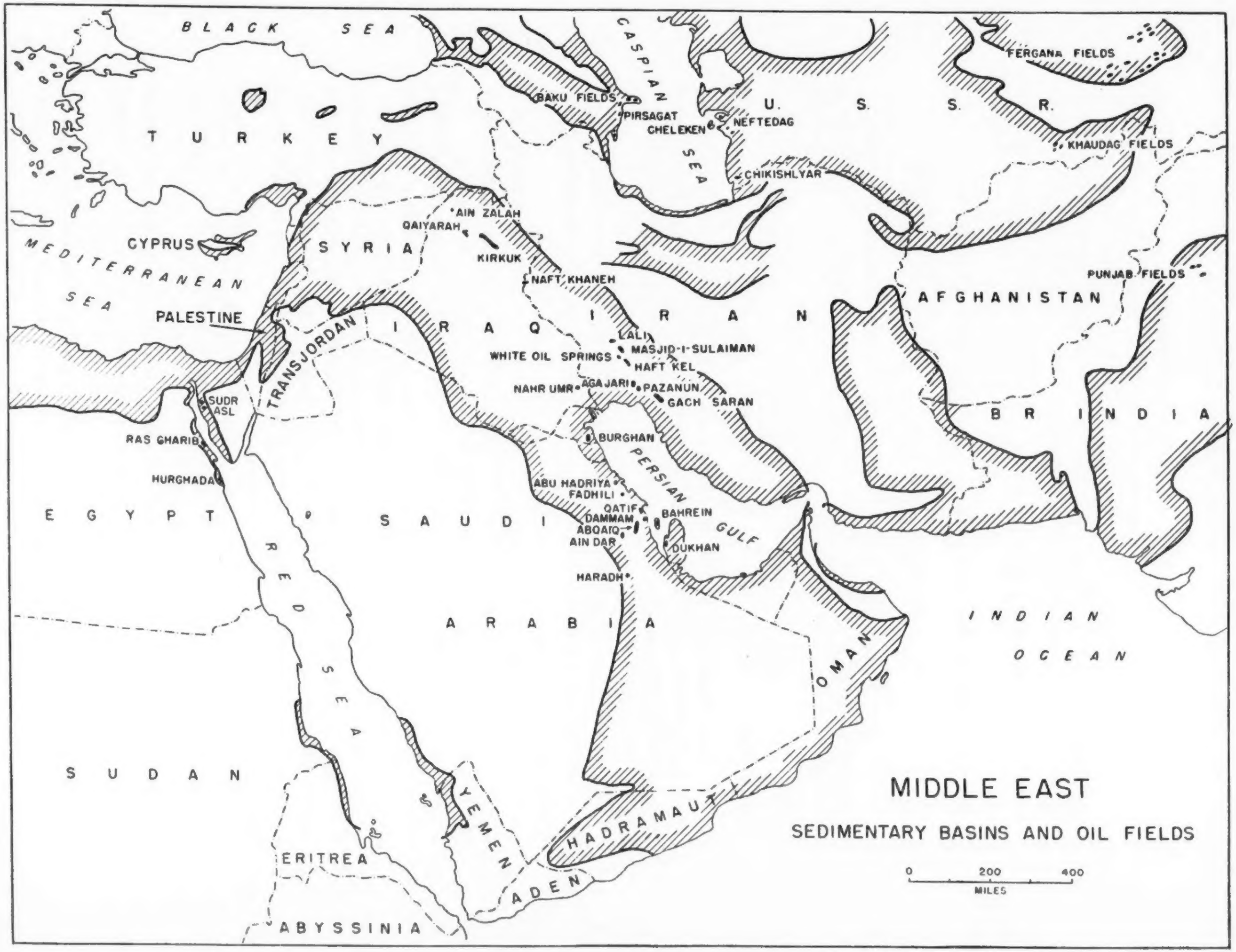

MIDDLE EAST
SEDIMENTARY BASINS AND OIL FIELDS
0
200
400
MILES
BLACK SEA
CASPIAN SEA
U. S. S. R.
FERGANA FIELDS
BAKU FIELDS
PIRSAGAT
CHELEKEN
NEFTEDAG
KHAUDAG FIELDS
CHIKISHLYAR
TURKEY
CYPRUS
MEDITERRANEAN SEA
SYRIA
AIN ZALAH
QAIYARAH
KIRKUK
NAFT KHANEH
PUNJAB FIELDS
AFGHANISTAN
PALESTINE
TRANSJORDAN
IRAQ
IRAN
LALI
MASJID-I-SULAIMAN
WHITE OIL SPRINGS
HAFT KEL
NAHR UMR
AGA JARI
PAZANUN
GACH SARAN
SUDR
ASL
BR INDIA
RAS GHARIB
BURGHAN
PERSIAN GULF
HURGHADA
ABU HADRIYA
FADHILI
QATIF
BAHREIN
DAMMAM
ABQAIQ
AIN DAR
DUKHAN
HARADH
EGYPT
SAUDI ARABIA
RED SEA
INDIAN OCEAN
OMAN
SUDAN
YEMEN
HADRAMAUT
ERITREA
ADEN
ABYSSINIA

FIG. 14

	Production in Barrels			
	1947		1948	
	Total	Daily	Total	Daily
Ras Gharib	8,847,000	24,200	9,323,315	25,474
Hurghada	351,000	1,000	340,830	931
Sudr	118,000	300	3,494,230	9,547
	9,316,000	25,500	13,158,375	35,952

The following summarizes production to the end of 1948 by fields.

Field	Oil Production			Gas Production Million Cu. Ft.	
	Year of Discovery	To End of 1948	During 1948	To End of 1948	During 1948
Ras Gharib	1938	78,432,347	9,323,315	12,436.9	1,800.4
Hurghada	1913	37,328,584	340,830	—	—
Gemsa	1908	1,420,000	—	—	—
Sudr	1946	3,618,197	3,494,230	—	—
Asl	1948		Testing	—	—
Ras Matarma	1948		Testing	—	—

The most important events in connection with oil development in Egypt during 1948 were the passage of the mines and quarries law and the discovery of two new producing areas on the east coast of the Gulf of Suez district, namely, Asl and Matarma.

Certain provisions of the mining law and of the license and lease forms, based on the mining law, are considered highly objectionable and very unsatisfactory to operate under.

Following passage of the mines and quarries law, the companies applied for various licenses, most of which however, are in the known producing province of the Gulf of Suez. To the end of the year, no licenses had been granted.

The two discoveries, Asl and Matarma, are 16 and 10 kilometers, respectively, south of Sudr field, which was discovered in 1947. Only two successful wells have been drilled in each field, and therefore, their extent is not known.

The Asl production is mostly from Eocene limestone beneath the Miocene unconformity and therefore similar to Sudr. The discovery well tested 1,500 barrels of 22° gravity oil through a $\frac{7}{16}$-inch choke from a depth of 3,872 feet. In the second well, a sand approximately 1,000 feet above the base of the Miocene tested 14° gravity oil on a drill-stem test.

The Matarma field produces from a sand in the Miocene which may correspond with the sand tested in the second well in the Asl field. The oil is 18° gravity, heavier than production from Asl and Sudr.

In the Sudr field, a well on the north found oil sands in the Miocene section corresponding with the productive interval at Matarma, but no tests have been made.

Most of the exploration activities, geological, geophysical, and drilling, were concentrated in the Gulf of Suez district. Geological parties were active in the

Gulf of Suez throughout the year and in the Western Desert for only a part of the year. Land and water gravity-meter and magnetometer parties were working in the Gulf of Suez district. Gravity-meter and magnetometer surveys were carried out in the Western Desert and the Delta areas. Seismic parties operated along the coasts of the Gulf of Suez and in the Western Desert.

APPROXIMATE NUMBER OF EXPLORATION PARTY MONTHS, BY METHODS

Geological field parties	27
Land gravity meter	12
Underwater gravity meter	5
Magnetometer	11
Seismograph	24

The following table shows that 8 wildcats were drilling in 1948. Of these, 3 were begun in 1947 and completed in 1948, 3 were begun and completed in 1948, and 2 which began in 1948 were still drilling at the close of the year.

WILDCAT WELLS ACTIVE DURING 1948

	Spudded	*Completed*	*T.D. (Feet)*	*Footage Drilled during Year*	*Results*
Feiran 1	8/19/48	Drlg. at end of yr.		6,543	Drlg. Oil show
Tawila 2	9/28/47	5/ 2/48	11,375	4,626	D&A No shows
Lagia 1	9/30/47	2/ 48	3,995	1,424	D&A —
Lagia 2	4/27/48	11/22/48	8,382	8,382	D&A Oil show
Matarma 1	3/14/48	8/ 1/48	6,093	6,093	D&A —
Matarma 2	8/ 9/48	11/15/48	3,649	3,649	Disc. well
Nebwi 2	10/30/48	Drlg. at end of yr.		3,200	Drlg.
Asl 2	8/ /47	2/ 2/48	3,910	Testing	Disc. well

SUMMARY OF EXPLOITATION WELLS

	Producers Completed during 1948	*Drilling or Testing 12/31/48*	*Dry Holes Completed during Year*	*Total*
Ras Gharib	4	1 (drilling)	0	5
Hurghada	1	1 (drilling)	2	4
Sudr	5	1 (drilling)	3	9
Matarma	0	1 (testing)	1	2
Asl	2	1 (drilling)	1	4
Totals	12	5	7	24

TURKEY

During 1948 two areas received the principal attention. They were: (1) the region between Raman and Diyarbakir in the Tigris valley in southeastern Turkey, and (2) the Adana basin on the Mediterranean coast in south-central Turkey.

A total of 12 geological party months and 27 geophysical crew months (18 seismic and 9 gravimetric) of work was accomplished during the year. In the coastal Adana basin, the United Geophysical and M.T.A. (Maden Tetkik ve

Arama Enstitusu, or Mining Research and Exploration Institute of Turkey) each had a seismic and a gravimetric crew operating.

The Raman or Ramandag area is not far north of the northern boundary of Iraq near which the Mosul Petroleum Company, Ltd. of the Iraq Petroleum Company, Ltd. group is developing its Ain Zalah field. About seven wells have been drilled on the Ramandag structure during the past nine years. Raman No. 9, completed in March, 1948, for a reported 300 barrels or so of 15° A.P.I. oil (swabbing) was the first that appears likely to produce in any quantity. The well was visited by President Inonu and party on March 3. This well and Raman 8 were both acidized with favorable results. The producing zone at Raman is at the top of the massive Cretaceous limestone which is considered to be Turonian in age. Well No. 11, which also encountered the producing zone, has not yet been completed. Raman 12 and 14 were drilling at 173 and 1,389 meters at the end of the year. Average depth of the producing zone is about 4,500 feet. Pumping of the producing wells has been discontinuous due to lack of storage facilities. Nearly 25,000 barrels of oil were produced and refined at the locally constructed topping plant during 1948.

The oil industry in Turkey is under the direction of M.T.A. of which Ihsan Ruhi Berent is president. He visited the United States and purchased drilling equipment in 1947. During the same year a contract was signed with the Drilling and Exploration Company of Dallas to handle the drilling in Turkey.

No drilling for oil has as yet been done in the Adana basin, though a score or more of core holes have been drilled, in some of which showings of oil are said to have been found.

Petroleum Development in Iraq, Cyprus, Lebanon, Palestine, Transjordan, Syria, Qatar, Trucial Coast, Muscat, Oman and Dhofar, and Hadramaut—Countries under Concession to Iraq Petroleum Company, Ltd., and Associated Companies

Drilling Operations

	Wells Completed		*Wells Drilling 12/31/48*	
	Exploration	*Exploitation*	*Exploration*	*Exploitation*
Iraq				
Kirkuk		3		2
Bai Hassan	1			
Ain Zalah		4		2
Mushorah			1	
Basrah			3	
Naft Khaneh		1		
Total Iraq	1	8	4	4
Lebanon	1			
Syria	1		2	
Qatar		3		2
Palestine				1 (Suspended)

Number of Geological and Geophysical Crews Operating—Estimated in Party Months

Country	*Geological*	*Geophysical*		
		Seismic	*Gravity*	*Magnetic*
Iraq	36	14	12	8
Cyprus		4		
Lebanon	12			
Palestine	6			
Transjordan	12		4	4
Syria	30	3	12	8
Qatar	18	3		
Trucial Coast	1	2	6	3
Muscat, Oman and Dhofar	2			
Hadramaut	3			

Iraq

Geological mapping and detailed stratigraphic studies were carried out in northern Iraq for purposes of broad regional interpretation of basinal conditions of the Persian Gulf geosyncline. From this work a better conception of reservoir conditions affecting oil accumulation has been attained; and furthermore considerable advancement in research on reef limestones has been made. This phase of exploration continues in north Iraq where exposures of sediments down to the Carboniferous and Devonian can be studied.

The accumulating evidence of conditions of deposition, derived from outcrop studies and drilled wells, offers considerable knowledge of oil accumulation throughout the entire Middle Eastern petroleum province. The application of this information should lead to increased discoveries and even surer evidence on which to locate wildcat tests.

The geologically blind areas of the upper Persian Gulf drainage basin were further explored by geophysical means, both gravity and seismic methods being employed extensively, and magnetics to a lesser degree. The results of these explorations have revealed numerous gravity anomalies which have been interpreted both as the results of tectonic folding and salt-dome action. The seismograph has confirmed several of the maxima and minima, and produced evidence on which suitable drilling sites for test wells were located.

One of the maxima confirmed by seismic methods to be an anticlinal fold of considerable size has been drilled, resulting in a producing well located west of the town of Basrah.

Another anomaly northeast of Basrah was also confirmed by the seismograph. Subsequent drilling has shown numerous strong oil shows in sediments ranging from the Miocene to Middle Cretaceous.

A third seismic high west of Basrah is being drilled.

The Bai Hassan structure, a well defined surface feature west of the Kirkuk field was tested in the Main limestone (Kirkuk producing zone). A large gas well resulted.

In northern Iraq two producers resulted from drilling on the semi-proved Ain Zalah structure where production was established pre-war. Drilling continues here.

An exploratory well commenced drilling on the Mushorah Dagh structure northwest of Ain Zalah.

Gravity and seismic surveys were conducted west of Baghdad in the vicinity of the Euphrates River.

The production of the area was 3,102,000 tons (23,930,000 barrels, or 65,560 barrels daily) from the Kirkuk field; and 369,000 tons (2,885,000 barrels or 7,925 barrels daily) from the Naft Khaneh field; or a total of 3,471,000 tons (26,815,000 barrels, or 73,465 barrels per day) from Iraq. Cumulative production from Iraq totals 407,235,000 barrels.

The other fields of Iraq and of the area discussed later were in an exploration state and/or pre-exportation stage.

A 16-inch pipeline paralleling the south leg of the 12-inch line from Kirkuk, Iraq to Haifa, Palestine was uncompleted due to political disturbances. The 16-inch line paralleling the 12-inch line from Haditha to Tripoli was under construction.

Two other major pipelines planned to terminate at the Mediterranean are in progress.

Cyprus

A detailed seismic survey was concluded in the Mesoria plain of central Cyprus.

Lebanon

Exploration in Lebanon consisted primarily in drilling a wildcat well at Terbol, north of Tripoli. The well was abandoned at 10,059 feet as non-commercial.

Stratigraphic studies in the exposure afforded by the Lebanon Mountains comprised the surface geologic exploration for the year.

Palestine

The wildcat well started at Huleiqat, near Gaza, was suspended at 3,464 feet due to political disturbances. Similarly progress on a proposed test well south of the Dead Sea was impeded.

Transjordan

Detailed surface geologic examinations were made throughout Transjordan supplemented by a comprehensive gravity survey.

Syria

Geological surveys and detailed stratigraphic studies were continued throughout Syria. The stratigraphic knowledge gained from these surface studies and from the wells drilled has greatly supplemented the knowledge of basinal conditions at the east near the center of the Persian Gulf geosyncline.

Gravity and magnetic surveys were conducted on a rather extensive scale west of the Euphrates River and westward to the Lebanon mountain front. The results were helpful in guiding exploratory drilling.

A wildcat well was completed at 8,666 feet on Baflioun structure northwest of Aleppo. The well finished in Carboniferous and was a dry hole.

Another wildcat was still drilling at the end of 1948 at Dolaa in the central Syrian desert east of Homs. The depth at the end of the year was 10,163 feet in Carboniferous, with no commercial showings.

Toual Abba structure, in north-central Syria near the Turkish frontier, was being drilled at the end of the year; drilling continues.

Qatar

The Dukhan structure was mapped in greater detail, and exploitation drilling was carried out on the north end of the structure. Three producing wells were completed in the program to put the field into exportation status as soon as shipping facilities can be installed.

A seismic survey was conducted over the main peninsula. A broad gravity survey was inaugurated over the same area.

Trucial Coast

Gravity surveys were concluded in the first half of the year. A check on these results was started by seismic methods.

Aerial reconnaissance was also carried out.

Hadramaut; Muscat, Oman, and Dhofar

A geological reconnaissance, extending over the eastern Hadramaut and eastward into Dhofar, Oman, and Muscat, was started in 1947 and completed in the first half of 1948.

Several aerial reconnaissance flights were made over the southern and eastern fringe of the Empty Quarter and the Oman Mountain Range and along the front of the range. Unfavorable terrane conditions made ground surveys difficult and progress slow.

Saudi Arabia

The coastal area of El Hasa Province continued during 1948 to be the only producing area of Saudi Arabia. Production averaged 390,577 barrels per day from 70 wells as compared with 246,169 barrels per day from 51 wells during 1947. Cumulative production from Saudi Arabia totals 346,000,000 barrels. Oil-production data are shown by the accompanying table.

Total footage drilled during 1948 (last 5 days estimated) was 157,363. A total of 24 wells was completed during the year. All were oil wells. Of these, 18 were completed in the Abqaiq field, 4 in Qatif field, and 2 at Ain Dar, the first of which was the discovery well.

SAUDI ARABIA OIL-PRODUCTION DATA

Field	*Discovery Date*	*Completed Oil Wells*		*Producing Wells*		*Daily Average Production*		*Cumulative Oil Production*
		1947	*1948*	*1947*	*1948*	*1947*	*1948*	*1948*
Dammam	1938	33	33	32	31	95,387	91,331	155,000,000
Abu Hadriya	1940	1	1	0	0	Shut in		Shut in
Abqaiq	1941	31	47	18	34	147,013	289,624	185,000,000
Qatif	1945	2	5	1	5	3,769	9,622	6,000,000
Ain Dar	1948	0	2	0	0	Shut in		Shut in
Totals		67	88	51	70	246,169	390,577	346,000,000

Cumulative number of wells drilled to the end of 1948, subdivided among oil wells, gas wells, dry holes, and abandoned wells, were as follows.

Field	*Oil Wells*	*Gas Wells*	*Dry Holes*	*Abandoned Producers*	*Total*
Dammam	33	1	3	1	38
Abqaiq	47[a]	0	1[b]	0	48
Qatif	5	0	1	0	6
Ain Dar	2	0	0	0	2
Abu Hadriya	1	0	1[c]	0	2
Wildcats	0[d]	0	3[e]	0	3
Total	88	1	9	1	99

[a] Includes former Buqqa field
[b] Completed as edgewater observation well
[c] Drilling suspended
[d] Does not include discovery wells for five fields named
[e] In order drilled: El Alat, Ma'aqala and El Jauf

The Ain Dar structure is 50 kilometers southwest of Abqaiq. It was proved productive from the same zone—the Arab Zone—that produces at Abqaiq, Dammam, and Qatif. Step-out drilling and the delineation of the axis of this structure are proceeding with 18,000 feet axial spacing. Well No. 3 is now drilling 36,000 feet south of well No. 1 and 18,000 feet south of No. 2.

At the close of the year, wildcat wells were being drilled at Fadhili, 95 kilometers northeast of Dammam (45 kilometers southeast of Abu Hadriya), and at Haradh, 275 kilometers southwest of Dammam.

Seven strings of tools were in operation throughout the year. At the close of the year these were distributed as follows: 3 at Abqaiq; 1 at Qatif; 1 at Ain Dar; and 2 on wildcats.

Geological and geophysical investigations consisted of: 2 surface-mapping parties on stratigraphic and geographic studies of the Tuwaiq Mountains for 12 months; 1 land gravity-meter party operating 2 meters for 12 months, and a one-meter marine party operating on shoals and islands for 3 months, during the closing months of the year; 1 seismograph party for 12 months; 3 structure-drill parties (6 drills) for 12 months, one operating on islands in the Persian Gulf; and 1 vertical and horizontal (triangulation and leveling)-control party for 12 months.

BAHREIN

Bahrein Island produced 10,914,905 barrels of oil during the year 1948.

No new wells were completed, but one drilling operation was carried on through the year to test the deep zones, and at the end of the year had penetrated the fourth producing zone and was 5,225 feet deep. The refinery operations were somewhat accelerated during 1948, and total through-put amounted to approximately 150,000 barrels per day, operating on Bahrein oil and crude supplied by pipeline from the Arabian fields.

One geophysical crew was employed in seismic work in the marine areas adjacent to the island.

BAHREIN WELL AND PRODUCTION DATA

Field	*Discovery Date*	*Completed Oil Wells*		*Producing Wells*		*Daily Average Production*		*Cumulative Oil Production*
		1947	*1948*	*1947*	*1948*	*1947*	*1948*	*1948*
Bahrein	1932	85	86	64	66	25,783	29,822	98,914,905

KUWAIT

All operations were centered in the Burghan field where production comes from three principal sand zones of Middle Cretaceous age with a total depth range in existing wells of 3,692 feet to 4,818 feet. Oil gravities average 32° API and gas-oil ratios average 500 cubic feet per barrel. Present drilling is being carried out on a 600-acre-per-well drainage pattern. All wells completed in 1948, except one, were dual-zone completions. Drilling and production data for the field are as follows.

	1947	*1948*
Number of rigs operating at end of year	5	9
Number of wells completed	5	24
Number of producing wells at end of year	13	36
Average production b/d in December	62,000	212,000
Average production b/d for year	44,500	127,000
Production during year, barrels	16,227,906	46,546,795
Cumulative production, barrels, to Jan. 1, 1949		68,702,680

A seismograph party started shooting in December and is expected to continue operations for several months.

IRAN

Anglo-Iranian Oil Company production by fields for the year 1948, in barrels, was as follows.

	1947		*1948*[a]	
	Total	*Daily Average*	*Total*	*Daily Average*
Masjid-i-Sulaiman[b]	21,261,300	58,091	25,750,000	70,355
Lali	18,300	50	2,963,000	8,096
Haft Kel	68,884,900	188,210	75,795,000	207,090
Naft Safid	4,945,700	13,513	1,244,000	3,399
Agha Jari	45,701,200	124,867	68,664,000	187,607
Gach Saran	13,142,200	35,908	14,814,000	40,475
Naft-i-Shah[b]	1,044,300	2,853	1,165,000	3,183
Totals	154,997,900	423,492	190,395,000	520,205

[a] Figures include estimates for November and December

[b] Net production, i.e. excluding recycled products.

FIG. 15 (West half)

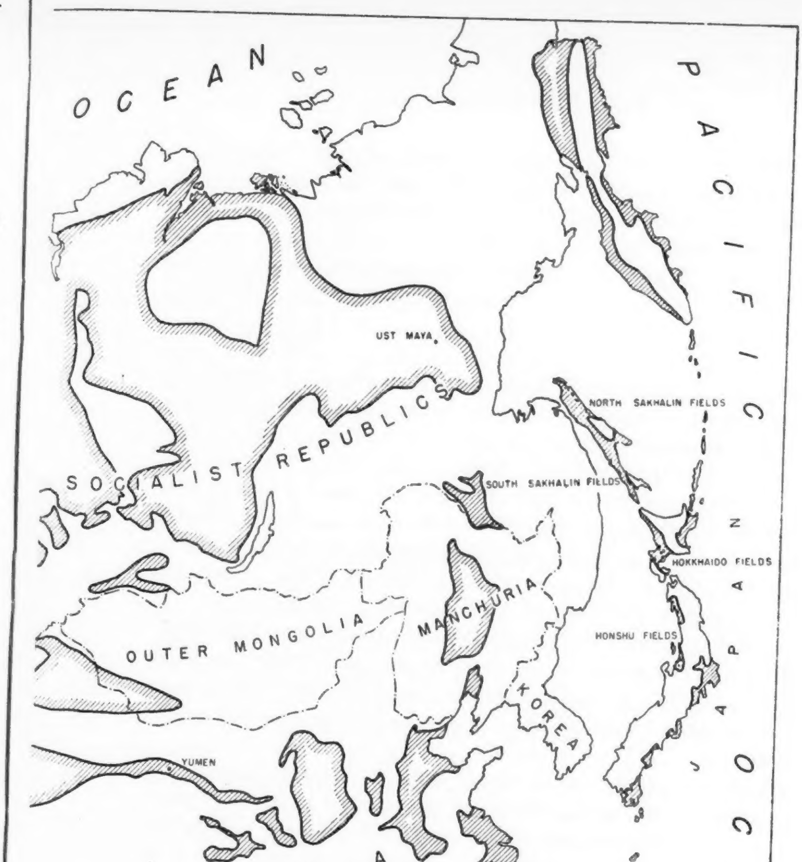


FIG. 15 (East half)

Cumulative production in Iran totals approximately 1,932,401 barrels.

Development drilling was active in the Lali, Naft Safid, and Agha Jari fields. Exploration drilling was carried out at Mamatain and Ahwaz, but in neither case had final tests been made at the end of the year.

Geological and aerial surveys were in progress and two seismic-refraction and one seismic-reflection party were at work throughout the year.

India

The total production of petroleum in India to the end of 1948 amounts to 43 million U. S. barrels, most of which was derived from the Digboi field on the south side of the Brahmaputra valley in the northeastern part of Assam. This field continued to produce at the usual level, the year's total being 1,930,000 barrels, equivalent to about 5,300 barrels daily. Drilling continued normally with emphasis on development in the eastern end of the field. An account of the Digboi field was given by E. V. Corps to the faculty of geology, Columbia University, and has since been published in the January, 1949, number of the Association *Bulletin*. Prospect drilling in the Makum-Namdang lease, 10 miles south of Digboi, has continued, but without success. Preparations are being made for drilling in the Tiru Hills, also on the south side of the Brahmaputra valley, 90 miles southwest of Digboi, and drilling material has been assembled at Masimpur in the Surma valley in southern Assam, and also on another prospect farther southwest in Tripura State.

Geological work has been continued in several parts of Assam, but the results have, on the whole, been discouraging. Extensive use is made of heavy-mineral evidence for purposes of correlation, and attention has recently been paid to the possibilities of micropaleo-botanical methods. Photogeological work has been proved to be very successful in helping to elucidate the structure even of heavily forested areas. A number of petroleum geologists from India attended the International Geological Congress.

The minerals policy of the Government of India is still under discussion and new mineral rules have not yet been published.

Pakistan

In eastern Pakistan some geological exploratory work has continued, but there has been no drilling.

In western Pakistan the Attock Oil Company continued to produce from the Khaur, Dhulian, and Joya Mair fields. Oil from the recently discovered Balkassar field is now being treated at the refinery in Rawalpindi, the pipeline connecting Balkassar with the Khaur-Rawalpinki line having been completed. Production from all fields in 1948 was approximately 560,000 U. S. barrels, or 1,535 barrels daily. The cumulative production up to the end of 1948 from this region (and for all of old India now embraced by Pakistan) is about 11 million U. S. barrels.

Drilling to prove the extent of the Balkassar structure has been in progress throughout the year; three wells were drilling but none were completed within the period. The Attock Oil Company's Balkassar No. 3 well has shown a considerable improvement after further treatment with acid. The Burmah Oil Company's Chakwal No. 2, also on the Balkassar structure, had a fishing job at 4,831 feet and is re-drilling from 1,770 feet.

The Balkassar oil is intermediate in character between the light crude from Dhulian and Khaur and the heavy asphaltic oil produced at Joya Mair.

The Attock Oil Company's third test well on the Meyal structure northwest of Dhulian was suspended for most of the year, pending the installation of a heavy derrick and outfit for deeper drilling. Some preparatory work was in progress on another area.

Burma

On January 4, 1948, Burma became an independent State. Under the new constitution, leases for minerals can not be granted to foreign companies, but existing rights are to be continued. During the early part of the year considerable progress was made in the reconstruction of the fields devastated by the war, and some geological mapping was undertaken in Myingyan district. Later, however, the country became increasingly disturbed and work on the pipeline between the oil fields and the site of the Syriam refinery near Rangoon had to be suspended, it being impossible to carry on in an area which was the scene of civil war and was also subject to the raids of dacoits (robber bands). Although work has been continued on the main fields, progress has been hindered by the unsettled state of the country, and in the smaller fields very little could be done. No new wells have been drilled, but a number of the damaged wells have been repaired. The oil produced has been utilized in a small topping plant at Chauk. The year's production amounted to 300,000 barrels (about 820 bbls. daily), which is only a small fraction of the pre-war annual production of around 7,500,000 barrels. The cumulative production to the end of 1948, according to the most recent estimates is about 288 million U. S. barrels.

An account of the geology of the Burma oil fields was given by H. R. Tainsh at the New York and Pasadena meetings of the American Association of Petroleum Geologists and will be published in the *Bulletin.*

The Burmah Oil Company is drilling a test well on the Lakhra structure, a broad anticlinal fold located about 100 miles northeast of Karachi, and had reached 4,800 feet by the end of the year. At this depth the well was in Lower Cretaceous rocks, having passed through thick beds of basalt (Deccan trap) between 2,478 and 2,933 feet.

Field work was carried out in western Pakistan by geologists of both the Burmah and Attock oil companies. During the early months of the year three seismic parties were working for the Burmah Oil Company in the Indus Valley, one being a refraction party loaned by the Anglo-Iranian Oil Company, one a

reflection party loaned by Shell, and the third a United Geophysical crew doing reflection shooting. The results, although technically good, were disappointing, and a large part of the concession over the Indus valley was relinquished. The seismic survey of the alluvial area was discontinued, and by the end of the year only the United party remained, engaged on work on the Chakwal area, checking the structure in the Eocene limestone near Balkassar and Joya Mair. A gravity party, using the North American gravimeter, was working in Sind for a few months, but this survey was also discontinued when the seismic surveys failed to reveal any structures worth testing.

As in the case of India, new mineral rules are to be issued by the Government; these were under consideration during 1948.

China

According to report, several parties of the Chinese Petroleum Corporation have been working during the past year in the Min Ho area westward from Lanchow in Kansu Province.

While authentic data are not available about Laochunmiao, the one field in Kansu, where the discovery well was drilled in 1939, unconfirmed reports indicate production at a rate of approximately 1,000 barrels per day. The cumulative total is reported to be approximately 3,000,000 barrels.

Production has continued in a small way in the Formosa fields, the output for the year being unofficially estimated at 17,000 barrels. The cumulative total figure, estimated at nearly 2,000,000 barrels, is represented largely by casinghead gasoline derived from the several gas fields.

Japan

The year has been marked throughout by labor unrest resulting from excess of personnel remaining in the industry from its war-time expansion overseas. The inevitable reduction has been achieved only after strikes and a "go slow" attitude on the part of labor which still persists. These events have caused a loss of production, a slowing of drilling activities, particularly in the Yabase field, and a weak financial position that has been reflected in inability to undertake exploration projects of a more costly nature in areas remote from existing facilities.

Drilling results have, however, shown some qualitative improvements. Of 25 exploratory wells brought to completion in the period April–December, 1948, 6 were oil and 3 were gas producers, a success ratio of 36 per cent. The 6 oil producers had an average daily initial production per well of 63 barrels. Of 9 exploitation wells completed in the same period, 7, with an average daily initial production per well of 43 barrels, were successful. Further successful progress was made in the development of dry-gas fields.

The new oil production was insufficient, however, to offset the decline, which

was considerably accentuated by the labor situation. Final figures are not yet available, but production for the calendar year 1948 was approximately 1,144,000 barrels, or 3,135 barrels daily, a moderate decrease from 1947. Cumulative oil production in Japan totals about 92,650,000 barrels.

Extensive field exploration activities have continued to define the limits of prospective oil provinces and to enhance the prospects of a number of areas which have not yet been tested.

Attention in the past has been concentrated on the Tertiary of the foothill folds. As yet there has been little or no exploration of the Cretaceous or of the alluviated or plains areas of the basins. Recognition of the geosynclinal facies and oil-bearing character of the Cretaceous in Hokkaido has drawn attention to new areas in which no exploration has yet been undertaken. In spite of the fact that this has been an oil-producing country for close to three quarters of a century, there is still substantial scope for exploratory effort and a possibility of producing a larger part of her requirements than she has in the past.

Philippine Islands

The Philippine Oil Development Company, Inc. has been the only company active in a drilling program. Grant W. Corby, consulting geologist for the P.O.D.C. and who has supplied the information for this review, had charge of the original geological work done by the Philippine Government. This survey lasted from 1939 to December, 1941, when the outbreak of the war prevented the completion of the study.

The Philippine Oil Development Company (formerly the Far East Oil Development Company, Inc.) was granted two concessions from the Government, one on the north end of the Island of Cebu, the other on the Bondoc Peninsula, Luzon Island. A well was drilled in 1947 on the Cebu lease to 9,950 feet. Although a large section of oil sand was encountered, it failed to produce. During 1948 a seismograph crew made a survey of the lease and revealed other favorable places on the lease to drill.

Two wells were drilled on the Bondoc Peninsula during 1948. Both wells had considerable oil in them. The first well drilled encountered 39° Baumé gravity oil, but caving difficulties prevented the well from going deeper than 1,325 feet.

The rig was moved 1,000 feet and the well re-drilled to a depth of 2,229 feet. Further drilling difficulties prevented the operations from going deeper. An oil zone was encountered between 1,750 and 2,229 feet and it was decided to test these showings. The 9-inch casing was set at 1,745 feet and a 7-inch perforated liner was run to bottom. The well flowed at the rate of 250 barrels per day for 36 hours, when the perforations became plugged and the 7-inch liner went bad at 1,900 feet.

An analysis of the oil as is follows.

Fig. 16 (West half)

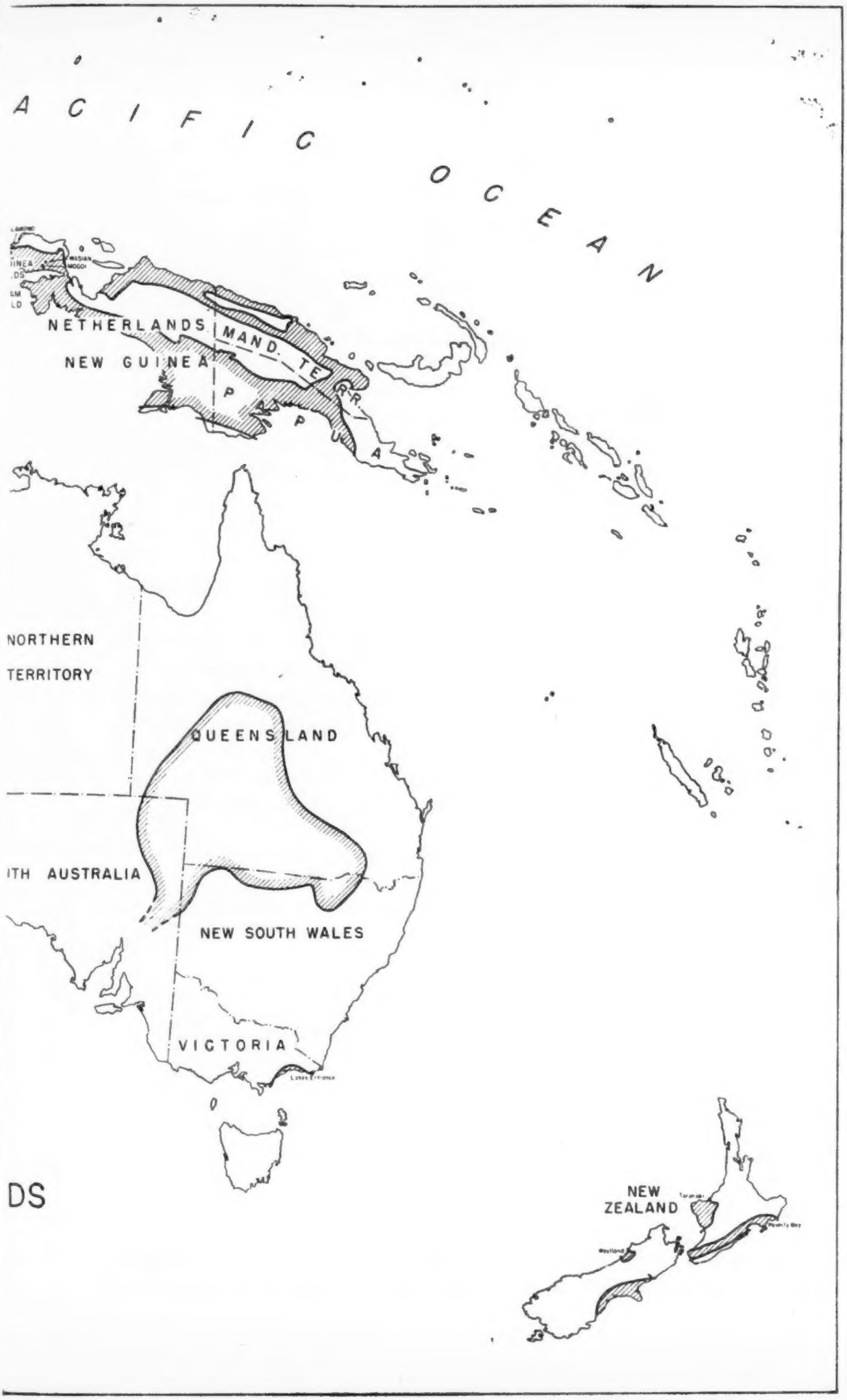


FIG. 16 (East half)

Specific Gravity	.904 or 25.0° API
Sulphur	.05%

Temperatures	*Fractions*		*Specific Gravities*
Initial boiling point	82°C.		
Over at	100°C. Water	0.5%	
Over at	100°C. No. 1	2.6%	.765 or 53.5° API
Over at	200°C. No. 2	4.1%	.814 or 42.4° API
Over at	250°C. No. 3	22.3%	.854 or 34.2° API
Over at	275°C. No. 4	17.6%	.886 or 28.2° API

Products obtained by volume

	Percentage
Water	0.5
Gasoline	6.7
Kerosene	39.9
Gas oil	12.3
Light lube stock	12.1
Heavy lube stock	15.2
Paraffin wax	7.9
Residue	5.4

Netherlands East Indies

In spite of the restricted scope of exploration and producing activities resulting from the unsettled political dispute, considerable progress is reported in the rehabilitation of the oil industry in Indonesia during 1948. Operations were, however, still confined to the South Sumatra, East Java, Southeast Borneo, Northeast Borneo, and New Guinea districts. North and central Sumatra, as well as the mid-Java district, had not yet been re-occupied and were inactive. Crude production for the year amounted to nearly 32,000,000 barrels, or an average of 87,000 b/d. During December, 1948 the producing rate was approximately 105,000 b/d, which is comparable with the pre-war output of 165,000 b/d.

Total Crude Production 1948 (Barrels)

	Total Year	*Av. Daily*	*Total to Date*
1947	7,967,570	21,825	1,109,387,000
1948	31,804,900 (Est.)	86,900	1,141,191,900

1948 Drilling Summary

	Completed Wells		*Exploration Wells*
	Exploitation	*Exploration*	*Drilling*
North Sumatra	—	—	—
Central Sumatra	—	—	—
South Sumatra (Palembang)	77	3	2
South Sumatra (Djambi)	—	—	—
East Java (Kroeka)	2	—	—
Southeast Borneo (Samarinda & Barito)	12	—	—
Northeast Borneo (Tarakan)	11	1	1
New Guinea	—	3	1
Total	102	7	4

The bulk of the year's production was obtained from the South Sumatra (Palembang) district. The fields of this district produced approximately 80% of

the total. The Northeast Borneo fields, including Tarakan and East Java (Soerabaja), produced the rest.

In Borneo, development of the Tandjoeng field in the Barito basin, Southeast Borneo, was continued. Five new wells were completed and the pipeline from this new field to the Balik Papan refinery was under construction. On the east coast a test drilled at Mengatal was dry and a deep test well was started at Sesanip on Tarakan Island.

In South Sumatra three new fields, Tandjoeng Tiga, Radja, and West Djirak, discovered in 1941, were placed on production. A deep test was undertaken in the Talang Djimar field and was incomplete at year's end. At Pajakaboeng, 40 kms. west of the town of Palembang, a shallow test was completed but has so far not been tested. A dry hole was drilled to a total depth of 9,504 feet at Gotit, north of the Radja field.

In New Guinea the Klamono field, in the North Vogelkop area, was placed on production in December, 1948, following the completion of the 8-inch pipeline and the road from Sorong. This field is being currently produced at the rate of 4,000 b/d. Shallow exploration drilling on several prospects north of the Klamono field reached inconclusive depths. A deep test is now being drilled on the Steenkool structure in the southern part of the Vogelkop area.

The Boenjoe field, on the Island of Boenjoe, Northeast Borneo, which was shut down in 1937, is to be re-opened and the drilling of a number of additional wells is planned. In 1937, prior to being closed in, the Boenjoe field had produced a total of 400,000 barrels.

No important additions to the country's crude oil reserves resulted from the 1948 exploration effort.

During 1948 geological and geophysical activities were resumed but these operations were of a rather restricted nature, as will be seen from the summary given below. At the close of the year three seismograph parties and seven gravitymeter parties were operating in the field. Nine geological survey parties were also active.

	Geological Party Months	*Seismic Crew Months*	*Gravity Crew Months*
North Sumatra	—	7	—
Central Sumatra	—	—	—
South Sumatra (Palembang)	16	6	30
South Sumatra (Djambi)	—	—	—
East Java	4	—	—
Southeast Borneo (Samarinda and Barito)	29	—	—
Northeast Borneo (Tarakan)	4	—	—
New Guinea	34	12	12
Total	87	25	42

British Borneo (Sarawak and Brunei)

Crude production in British Borneo in 1948 was greatly increased as a result of the successful development of the Seria field in the Brunei district. Twenty-two

new wells were drilled, and at the close of the year this field was producing 61,000 barrels per day from a total of 140 wells. The total production for the year from Sarawak and Brunei amounted to 20,165,000 barrels, or an average of 55,000 barrels per day, which is more than three times the pre-war rate.

CRUDE PROTECTION (U. S. BARRELS)

SARAWAK OIL FIELDS, LTD.

	Total Year	*Av. Daily*	*Production to Date*
1947	12,974,490	35,500	
1948	20,124,666	55,000	152,412,000

PRODUCTION BY FIELDS (U. S. BARRELS)

	1947 Total	*1948 Total*	*Daily Average 1948*
Seria	12,794,923	19,765,067	54,006
Miri	179,567	359,599	981
Total	12,974,490	20,124,666	54,987

A further expansion of drilling and producing operations at Seria is planned during 1949, when offshore drilling is to be undertaken. The construction of a new and larger refinery on the Island of Muara is also planned. The present refinery at Lutong has a capacity of only 25,000 barrels per day and the production in excess of the refinery capacity has been shipped to the Shell's Pladjoe refinery at Palembang, Sumatra, for processing.

One seismograph party (8 party months) and two geological parties (15 party months) were active in the field. No wildcat drilling was undertaken in British Borneo during 1948.

TERRITORIES OF PAPUA AND EASTERN NEW GUINEA (ADMINISTERED BY AUSTRALIAN COMMONWEALTH)

During 1948, the Australasian Petroleum Company Pty. Ltd. (80% of capital held equally by the D'Arcy Exploration Company Ltd. (Anglo-Iranian) and Vacuum Oil Company Pty. Ltd. (Socony-Vacuum and Standard Oil Company (N.J.), and most of the balance by Oil Search Ltd.) expanded operations on the areas held under permits to prospect for petroleum, particularly in the Papuan or southeastern part of the Island of New Guinea.

Additional areas were added to the regional geological map and several anticlinal structures were mapped in detail or semi-detail by geologic parties operating over about 42 party months.

Gravity-meter and magnetometer surveys in western Papua which, following suspension over the war years, had been resumed early in 1947, were extended considerably by 12 party months of gravity-meter work and approximately 6 party months of magnetometer observations. Seismic-reflection work, which likewise had been discontinued through war reasons in 1940, was recommenced late in 1948 by a party which proceeded into the field in November.

The Kariava exploratory well, which had reached 11,219 feet at the end of

1947, was discontinued, as a dry hole, at 12,621 feet at the end of March, and transfer of plant to Hohoro began shortly afterwards.

Drilling of an exploratory well to test structure at Oroi, approximately 56 miles northwest of Port Moresby, commenced in mid-September but, owing to delay in arrival of power units and formation troubles encountered in the well, the depth remained at 1,694 feet at the year end.

Constructional work and rig erecting at two new drilling areas, Upoia and Hohoro, near the lower Vailala River, had reached an advanced stage by the end of the year and both plants were expected to spud in early 1949.

A party, comprising geologists of the Bureau of Mineral Resources, Geology, and Geophysics, and the Richfield Oil Corporation, investigated the Papuan-Apinaipi Petroleum Company's area late in 1947, and the Bureau's geologists mapped the Lesi structure in detail from December, 1948, to February, 1949, inclusive.

During 1949 the number of drilling rigs operating on the exploratory program will be increased to five.

Operations on permit areas held by the Island Exploration Company Pty. Ltd. (capital 50% each D'Arcy Exploration Company Ltd. and Vacuum Oil Company Pty. Ltd.) which collaborates closely with the Australasian Petroleum Company, consisted of about 24 party months of regional and detailed geologic mapping and an extension of gravity-meter observations to the easternmost permit area, towards the year end, by the party operating for the Australasian Petroleum Company.

During the year the Australasian Petroleum Company Pty. Ltd. surrendered about 1,000 square miles from its permit No. 5 and the bulk of permit No. 13, Papua, and in lieu thereof was granted a new permit area of approximately 1,800 square miles in the delta area between the Kikori and Purari rivers.

Owing to the physical conditions, the primitive state of the bulk of the inhabitants who form the source of unskilled labor, and a practically complete absence of land highways, New Guinea presents difficulties to the conducting of an oil-prospecting campaign incomparably greater than are met in most countries. For instance, the present seismic-refraction survey which in most countries would be little more than a routine task, under New Guinea conditions approaches a major operation involving employment of large gangs of labor under European supervision for several months in advance to clear jungle for camp sites, air-dropping strips and carrying paths, before a line or arc is surveyed, far less shot. Likewise with exploratory drilling, months of construction of road inland from waterways, housing for staff and labor, workshops, *et cetera*, must precede the placing of rig foundations.

Australia

Geologic exploration and core drilling were continued by the Shell Company in the Permian Coal Measures area around Warrinilla in the Rolleston area

in east-central Queensland, and preparations are now being made to drill a deep test.

In the southwestern part of the Great Artesian Basin (southeast-central Australia), a prospecting company, owned equally by the D'Arcy Exploration (Anglo-Iranian), the Vacuum Oil, and the Australian Zinc Corporation, continued geological and geophysical explorations. After 6 party months of gravity-magnetic surveys had been carried out, the D'Arcy and Vacuum decided to give up their interest in this area. The Zinc Corporation, however, in the hope of discovering natural gas, decided to continue, and drilled a well to 3,256 feet at Kopperamanna, northwest of Lake Frome in the southwest part of the Great Artesian Basin.

The D'Arcy-Vacuum-Zinc Company group continued geological surveys in their Desert basin concession in Western Australia. In the same basin, preparations are being made by the Freney-Kimberley Oil Company for resuming drilling on their Nerrima test in the lower Fitzroy River region where drilling was suspended at a depth of 4,271 feet early in the war.

The Australian Motorists Petrol Company, Ltd. (Richfield) has carried on reconnaissance geological surveys, intermittently, on concession holdings in various parts of Western Australia. Among localities that have received attention is the Cape Range anticline in the Northwest basin, part of which structure has long been held under concession by Oil Search Ltd., an Australian company. It is understood that geological parties are now in the field and that a deep test of this area is planned.

Geologists of the Commonwealth Bureau of Mineral Resources, Geology, and Geophysics were active in the Northwest basin and in Dampier Land and the Fitzroy River area of the Desert basin of Western Australia. Geophysicists of this Bureau carried out extensive magnetic and gravity surveys in the vicinity of Roma, Queensland, and a small amount of gravity work in the Lake Frome area of South Australia. Further work in these areas is planned for 1949.

During 1948 a total of 56 party months of geologic work and 8 crew months each of gravity and magnetic studies were done in Australia.

At Gippsland, Victoria, southeast Australia, Lake Oil Limited was drilling radially from the base of a 1,200-foot shaft (Ranney method) in an attempt to recover oil in commercial quantities from a low-pressure glauconitic sandstone band. Minor quantities of oil, the only oil production in Australia, have for some years been obtained here from a coastal Tertiary overlap in what is known as the Lakes Entrance field.

WORLD-WIDE GEOLOGICAL AND GEOPHYSICAL ACTIVITY IN 1948
IN PARTY - OR CREW-MONTHS*

Country	Geologic	Seismic	Gravity	Magneto-meter	Electrical
Alaska	12	21	-	-	-
Canada	146(a)	381	109	8	-
United States	?	5,520	1,320	200	?
Mexico	146	160	47	-	12
Guatemala	20	-	13	-	-
Nicaragua	4	4	-	-	-
Panama	12	-	-	-	-
Bahamas	-	7	5	-	-
Cuba	12	6.5	8	1	-
Trinidad	60	?	24	-	-
Venezuela	283(b)	285	102	1	-
Colombia	299	100	56	37(c)	-
Ecuador	-	-	-	-	-
Peru	68	12	12	-	-
Chile	8	14	12	-	-
Argentina	?	?	?		
Bolivia	?	-	-	-	-
Paraguay	4?	34	-	-	-
Brazil	51	24	15	-	-
Great Britain	-	12	12	12	-
Netherlands	-	31	12	-	-
France	158	18	16	-	10(d)
Denmark	24(g)	12	6	-	-
Germany	?	157(e)	26(f)	-	-
Austria	?(h)				
Hungary	?	?	35?		?
Yugoslavia	?				
Czechoslovakia	?				
Poland	?				
Roumania	?				
Russia	?	?	?	?	?
Italy	10?	30	8	-	6?(d)
Spain	?	-	-	-	-
Portugal	30	-	-	-	-
Spanish Morocco	?	-	-	-	-
French Morocco	56.5	12	12	12	19(i)
Algeria	108	-	1	-	-
Tunisia	40	-	11	-	2(d)
Nigeria	16?	8	8	-	-
French Equitorial Africa	25	-	8	8	-
Angola	?	-	-	-	-
Mozambique	2	-	-	3(j)	-
Madagascar	31	-	16	8	-
Ethiopia	8	-	-	-	-
Egypt	27	24	17	11	-
Turkey	?	18	9	-	-
Cyprus	-	4	-	-	-
Lebanon	12	-	-	-	-
Palestine	6	-	-	-	-
Transjordan	12	-	4	4	-
Syria	30	3	12	8	-
Iraq	36	14	12	8	-
Qatar	18	3	-	-	-
Hadramaut	3	-	-	-	-
Trucial Coast	1	2	6	3	-
Muscat,Oman and Dhofar	2	-	-	-	-
Arabia	60(k)	12	27	-	-
Bahrein	-	2	-	-	-
Kuwait	-	1	-	-	-
Iran	13	34(l)	-	-	-
India	?	-	-	-	-
Pakistan	?	18	4	-	-
Burma	?	-	-	-	-
China	?				
Japan	?				
Philippines	?		?	-	-
Netherlands East Indies	87	25	42	-	-
British Borneo	15	8	-	-	-
Papua and Eastern New Guinea	66	2	12	8	-
Portuguese Timor	?	-	4	-	-
Australia	56	-	8	8	-

* Note: A dash (-) indicates no activity; a blank indicates no information; while a (?) indicates activity, or probable activity, but of unknown amount.

(a) Includes 60 rig-months of core drilling.
(b) Includes 47.3 rig-months of structure drilling.
(c) Does not include aerial magnetic survey of the large Llanos basin east of the Andes by Gulf Oil Corporation.
(d) All applicable to telluric current method.
(e) Divided between 146 reflection and 11 refraction crew-months.
(f) Includes 5 torsion balance crew-months.
(g) Consists of operation of 2 portable rigs on structure drilling.
(h) The work done includes an appreciable amount of core drilling.
(i) Includes 12 crew-months by telluric current method.
(j) Aerial magnetometer.
(k) Includes 3 structure drill parties (6 drills) for 12 months each.
(l) Divided between 24 refraction and 10 reflection crew-months.

WORLD CRUDE-OIL PRODUCTION (BARRELS 42's)

	Cumulative through 1948	Daily Average 1939	Daily Average 1947	Daily Average 1948
United States	37,099,169,000	3,465,649	5,085,200	5,510,000
Canada	143,200,000	20,664	20,000	32,500
Cuba	712,000	--	700	300
Mexico	2,369,627,000	117,203	153,800	160,000
Other North America	406,000	--	—	—
Total North America	39,613,114,000	3,603,516	5,259,700	5,702,800
Venezuela	4,536,260,000	562,829	1,190,800	1,338,760
Colombia	440,180,000	64,835	70,700	64,880
Trinidad	368,986,000	53,541	56,000	55,160
Argentina	409,027,000	50,999	59,900	64,000
Bolivia	4,371,000	589	1,300	1,270
Brazil	534,000	—	300	400
Ecuador	44,488,000	6,461	6,600	7,000
Peru	372,246,000	37,007	35,000	38,440
Total South America	6,176,092,000	776,261	1,420,600	1,569,930
Total W. Hemis. except U.S.	8,690,037,000	914,128	1,595,100	1,762,730
Total Western Hemisphere	45,789,206,000	4,379,777	6,680,300	7,272,730
Albania	9,944,000	3,027	1,000	1,000
Austria	53,353,000	2,580	16,000	16,870
Czechoslovakia	4,290,000	325	700	500
France	14,779,000	1,370	1,100	1,100
Germany	92,635,000	12,823	11,000	13,000
Great Britain	4,219,000	88	1,000	1,000
Hungary	42,594,000	3,069	11,900	10,000
+Italy	3,391,000	241	200	180
Netherlands	5,411,000	—	4,000	9,410
Poland*	269,480,000	9,058+	2,600#	3,000#
Roumania	1,202,586,000	127,141	78,000	83,200
Yugoslavia	3,105,000	—	1,000	1,000
Total Europe, except Russia	1,705,787,000	159,722	128,500	139,360
Egypt	120,799,000	12,796	25,500	35,950
Iraq	407,235,000	82,079	99,200	73,460
Iran	1,932,401,000	202,611	423,500	520,200
Bahrein	98,915,000	20,791	25,800	29,820
Arabia	346,000,000	10,778	246,200	390,570
Qatar	26,000	—	—	—
Kuwait	68,703,000	—	44,500	127,000
Other Africa	557,000	—	—	—
Total Near and Middle East	2,974,636,000	329,055	864,700	1,177,000
Burma	288,000,000	21,570	600	820
China	3,526,000	—	1,100	1,000
Japan	92,650,000	6,471	3,600	3,135
India	43,000,000	—	—	5,300
Pakistan	11,000,000	6,375	6,100	1,535
Total South and East Asia	438,176,000	34,416	11,400	11,790
British Borneo	152,412,000	19,383	36,100	55,100
Netherlands East Indies	1,141,192,000	160,554	22,000	86,900
Total Oceania	1,293,604,000	179,937	58,100	142,000
Total E.Hem. except Russia	6,412,203,000	703,130	1,062,700	1,470,150
Total Foreign, except Russia	15,102,240,000	1,617,258	2,657,800	3,232,880
Russia* and Sakhalin	6,015,000,000	611,319	535,000	600,000
Total Foreign	21,117,240,000	2,228,577	3,192,800	3,832,880
Total World	58,216,409,000	5,694,226	8,278,000	9,342,880

* Eastern Poland included with Russia commencing 1941
\+ Pre-war territories
\# Western Poland only

BULLETIN OF THE AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS
VOL. 33, NO. 6 (JUNE, 1949), PP. 1125-1134

AT HOME AND ABROAD

NEWS OF THE PROFESSION

President C. W. TOMLINSON has appeared before affiliated societies of the Association as shown by the following schedule.

March	2	Dallas Geological Society
	24	Oklahoma City Geological Society
April	7	Ardmore Geological Society
May	3	New Orleans Geological Society
	3	Southeastern Geological Society, Tallahassee, Florida
	4	Mississippi Geological Society, Jackson
	5	Shreveport Geological Society
	9	Abilene Geological Society, Abilene, Texas
	10	West Texas Geological Society, Midland
	11	Michigan Geological Society, East Lansing
	19	East Texas Geological Society, Tyler
	20	South Louisiana Geological Society, Lake Charles
	23	Houston Geological Society
	24	South Texas Geological Society, San Antonio
	25	Corpus Christi Geological Society
	27	Kansas Geological Society, Wichita
	30	Alberta Society of Petroleum Geologists, Calgary

President Tomlinson has also recently addressed student audiences, including the universities of Oklahoma, Michigan, and Wisconsin.

JOE NETICK, formerly with the Pure Oil Company, has left Houston, Texas, to go with the Superior Oil Company of Venezuela, at Caracas.

JAMES R. WHITE has moved from The Texas Company, Midland, to the Rowan Oil Company, Fort Worth, Texas.

C. W. TOMLINSON, president of the Association, discussed "Odd Geologic Structures in South Oklahoma," at the meeting of the Shreveport Geological Society, Shreveport, Louisiana, May 5.

The Rocky Mountain Association of Geologists staged an informal session at the Albany Hotel, Denver, Colorado, May 10. H. E. CHRISTENSEN, WARREN O. THOMPSON and A. E. BRAINERD led the discussion on "Origin, Migration, and Accumulation of Oil in the Rocky Mountain Region."

NORMAN C. SMITH is with the Western Photo Geological Company, 811 South Boulder Avenue, Tulsa, Oklahoma. He was formerly with the Humble Oil and Refining Company at Tallahassee, Florida.

THEODORE A. LINK, consulting geologist, has two addresses: (1) 31st Floor, 25 King Street West, Toronto, Ontario, Canada; and (2) 810A First Street West, Calgary, Alberta, Canada. The address shown for him in the March *Bulletin* membership list is in error. Link is vice-president of the A.A.P.G., and vice-president of the Geological Association of Canada.

JOHN CRAWFORD DUNLAP, formerly with the United States Geological Survey, is with DEGOLYER and MACNAUGHTON, and may be addressed at 1000 Continental Building, Dallas, Texas.

At the annual meeting of the New Mexico Geological Society, held at Albuquerque, New Mexico, on April 30, the following officers were elected for the 1949 term: president, STUART A. NORTHROP, University of New Mexico; 1st vice-president, CHARLES B. REED; 2d vice-president, HARRISON SCHMIDT; secretary-treasurer, PAUL H. UMBACH, Stanolind Oil and Gas Company, Box 335, Albuquerque.

HORACE D. THOMAS, Wyoming State geologist and professor of geology at the University of Wyoming, spoke before the New Mexico Geological Society April 30, on "Regional Stratigraphy and Structure of Wyoming."

W. E. BIVENS, JR., left the Sun Oil Company last fall to accept a position as chief geologist for the G. W. Strake interests. Bivens has offices at 1014 McBurnett Building in San Angelo, Texas, and 3300 Gulf Building in Houston.

RAYMOND C. MOORE is working during summer and fall months of 1949 in Japan. In connection with the Visiting Expert program of SCAP GHQ in Tokyo, he is attached to the Natural Resources Section, of which Lieutenant Colonel HUBERT G. SCHENCK is chief, and will be engaged on stratigraphic and paleontologic studies related to coal and oil development.

The Kansas Geological Society formally opened its new Service Building located at Murdock and Emporia Streets in Wichita, Kansas, on May 27, 1949. Many geologists from State surveys, local geological societies in the Mid-Continent, and national organizations were present for the occasion. C. W. TOMLINSON, president of the A.A.P.G. gave the principal address at the opening technical session, Friday evening, May 27. On Saturday and Sunday, May 28 and 29, open house for members of the oil industry was held with refreshments served through the courtesy of three well-logging companies, Halliburton, Lane-Wells, and Schlumberger. This new building will permanently house the Kansas Well Log Bureau and the Kansas Sample Bureau, both public service organizations sponsored by the Kansas Geological Society. This is the first such building constructed and owned by a local geological society. The building committee includes: E. GAIL CARPENTER, chairman; L. C. HAY; and DON W. PAYNE, ex-officio, as president of the Kansas Geological Society.

The Shreveport Geological Society, Shreveport, Louisiana, listened to a discussion of "The Pecan Gap of Texas," by JOHN T. ROUSE, of the Magnolia Petroleum Company, Dallas, Texas, May 2.

Recent speakers at meetings of the Tulsa Geological Society were: EDWARD A. KOESTER, consultant of Wichita, Kansas, "Exploration Policies in Kansas from 1928 to 1949," May 2; HENRY SCHAEFFER, Stanolind Oil and Gas Company, Tulsa Oklahoma, "Limestone Pore Space Study," April 20; HUGH D. MISER, United States Geological Survey, Washington, D. C., "Arkansas Quartz Crystals," May 6.

ALLEN F. AGNEW has resigned his position as assistant professor of geology at the University of Alabama to return to the United States Geological Survey as geologist in the Wisconsin lead-zinc district.

ELMO W. ADAMS has established his consulting office at 223 DeYoung Building, 690 Market Street, San Francisco, California.

JOHN HOWARD SAMUELL, First National Bank in Dallas has been promoted to Lieutenant Colonel, Corps of Engineers Reserve.

ROBERT D. CHENEY, consulting geologist of Albuquerque, New Mexico, died at Tulsa, Oklahoma, April 21, at the age of 44 years.

FRANCIS P. SHEPARD, professor of submarine geology at the Scripps Institute of Oceanography, La Jolla, spoke before the A.A.P.G. Pacific Section on "Sediment Patterns on the Asiatic Continental Shelves," at Los Angeles, May 4.

RICHARD R. CRANDALL, consulting geologist, died at Pasadena, California, April 16, at the age of 47 years.

The North Texas Geological Society of Wichita Falls, Texas, has elected officers as follows: president, J. W. MCDONALD, Shell Oil Company; vice-president, RALPH H. MCKINLAY, Panhandle Producing and Refining Company; secretary-treasurer, WALTER L. AMMON, Stanolind Oil and Gas Company, Box 1680, Hamilton Building. Luncheons are held on the first and third Thursdays of each month in the Texas Room, Holt Hotel, 12:00 noon.

CHESTER M. CREBBS, president of the Mene Grande Oil Company in Caracas, Venezuela, retired on May 1, 1949, after 31 years of service with the Gulf Companies. Mr. Crebbs began his career with the Gulf Production Company, at Fort Worth, Texas, on April 7, 1918. After one year in France during the first World War, he returned to the Gulf Corporation as geologist, in the summer of 1919. In October of that year he was transferred to Mexico as geologist, and later was made chief geologist of the Mexican Gulf Oil Company at Tampico. He first went to Venezuela in February, 1923, as general agent for the Venezuela Gulf Oil Company. Following acquisition by the Venezuela Gulf Oil Company of Mene Grande Oil Company in 1936, he was elected president of Mene Grande with headquarters in Caracas. Crebbs served in this capacity until his retirement. He is succeeded as president by HOYT SHERMAN, who has served as assistant to Crebbs in various capacities since 1928, and who has held the position of vice-president of the company since 1947. Although Crebbs has not yet definitely decided on a permanent residence, he will be located temporarily at Route Six, Box 689, Tucson, Arizona.

JOSEPH AUGUSTINE CUSHMAN, age 68 years, died on April 16. He had been director of the Cushman Laboratory for Foraminiferal Research since 1923, had taught at Harvard University since 1925, and had been in the employ of the United States Geological Survey since 1927. He joined the Association in 1924.

I. G. GROSSMAN has changed his address from the University of North Dakota to the United States Bureau of Mines, Petroleum Economics Branch, Washington, D. C.

I. E. ALTINLI, who has been at the California Institute of Technology, has returned to Turkey. His address is Jeoloji Enstitusu, Muftuluk fen Fakultesi, Universite, Istanbul.

GIDEON C. MAYFIELD has left the employ of Leland Fikes, and has opened an independent geological office at 1108 Tenth Street, Lubbock, Texas.

ARTHUR L. HILL, formerly with the Pacific Gas and Electric Company, San Francisco, California, is with the El Paso Natural Gas Company, National Standard Building, Houston, Texas.

ROBERT B. MCCONNELL has resigned from the Baroid Sales Division of the National Lead Company and is now employed as geologist by the Farmers Union Central Exchange, Billings, Montana.

ERNEST GUY ROBINSON is with the Shell Oil Company of Canada, Ltd., Calgary, Alberta.

HAROLD C. MOSHER, of the University of Wyoming, is with the Sohio Petroleum Company at Casper, Wyoming.

MORTON BIGGER, JR., has changed his address from the California Company, New Orleans, Louisiana, to the Republic Natural Gas Company, Dallas, Texas.

IRVING PERRINE, long a resident of Oklahoma City, is professor of geology at Oklahoma City University.

FRANK ITTNER has been appointed manager of exploration for the Pacific division of the Superior Oil Company. He will have charge of all geology, geophysical work, and land matters connected with exploration.

GEOLOGIST NEEDED IN FEDERAL SERVICE

The United States Civil Service Commission has been accepting applications for some time for its Geologist examination. However, sufficient eligibles have not yet been obtained, and the Commission again wishes to bring the examination to the attention of qualified persons who have not applied.

The geologist positions to be filled are located in various Federal agencies in Washington, D. C., and vicinity and in the Departments of Agriculture and the Interior, throughout the United States. Salaries range from $4,479 to $7,432 a year. Competitors will not be required to take a written test. To qualify, they must have completed college study in geology or must have a combination of such study and technical experience. In addition they must have had professional experience in geology.

Further information and application forms may be obtained from the United States Civil Service Commission, Washington 25, D. C., from first- and second-class post offices, and from Civil Service regional offices. Applications will be accepted in the Commission's Washington office until further notice.

MISSISSIPPI GEOLOGICAL SOCIETY FIELD TRIP, AUGUST 23–27, 1949

The Mississippi Geological Society has announced plans for its seventh field trip, "Pre-Cambrian and Paleozoic Rocks of Northern Alabama and South-Central Tennessee." Registration will be at the Thomas Jefferson Hotel in Birmingham on the evening of August 23. The 24th will be spent studying the crystalline and metamorphic rocks of eastern Alabama with HUGH D. PALLISTER as leader. The 25th will be spent studying the geology of the Birmingham district with ARTHUR BLAIR as leader. The 26th will be spent in the Black Warrior Basin and Tennessee Valley areas with WALTER B. JONES and WINNIE McGLAMERY as leaders. The 27th, leaving Florence, Alabama, will be spent in the Silurian and Devonian areas of south-central Tennessee with CHARLES W. WILSON, JR., as leader. While the prime objective is the study of many thousands of feet of rocks, numerous points of economic, recreational and scenic interest will be observed. In charge of the trip for the Society are FRED MELLEN, chairman, FRED HOLDEN, editor, CHARLIE WALTON, arrangements, LARRY FINFROCK, finance, DAVE HARRELL, 1st day, BOB MORTON, 2d day, R. PAVLOVIC, 3d day, and JOHN BROWN, 4th day. Further announcements are forthcoming.

The Pacific Section of the Association plans to hold its annual fall meeting at the Ambassador Hotel, Los Angeles, California, November 17 and 18.

A. L. BELL has returned to Peru as head of the exploration department of the International Petroleum Company, Ltd., after 2 years in the Toronto office. His address is Apartado 1081, Lima, Peru.

After September 1, KEITH M. HUSSEY will teach at the Iowa State College, Ames, Iowa. This summer he is at the Oklahoma University Geology Field Camp, Florence, Colorado.

M. B. CROCKFORD has severed his connection with the Research Council, University of Alberta, and is now geologist with the Province of Alberta Petroleum and Natural Gas Conservation Board at Calgary.

JULIAN Q. MYERS, senior geologist for the Shell Oil Company, Inc., at San Antonio, Texas, has retired after 23 years of service.

E. W. BELTZ, formerly with the Standard Vacuum Oil Company is with the Arctic Contractors, Box 1310, Fairbanks, Alaska.

ARTHUR A. CURTICE is president of the Conorada Petroleum Corporation, organized by the Continental Oil Company, the Ohio Oil Company, and the Amerada Petroleum Corporation to investigate prospects for the development of oil-producing properties abroad. The corporation office is at 630 Fifth Avenue, New York, N. Y.

The following speaking program was presented at the Geological Forum of the Pacific Section at Los Angeles, California, May 16: ARTHUR S. HUEY, Hancock Oil Company, "Some Features of the Faulting in the Subsurface at Cuyama"; ROBERT H. PASCHALL, Amerada Petroleum Corporation, "A Method of Dip Contouring"; and LOWELL E. REDWINE, Honolulu Oil Corporation, "Santa Rosa Island—An Informal Discussion."

The following men were elected as officers of the Michigan Geological Society, Mount Pleasant, Michigan, for the year 1949–1950: president, GLENN C. SLEIGHT, Sun Oil Company, Taylor Building; vice-president, MANLEY OSGOOD, JR., consultant, 502 South Arnold Street; secretary-treasurer, JACK MORTENSON, Sohio Oil Company, 601 South Main Street; business manager, KENNETH G. WALSWORTH, Department of Conservation, Box 176.

The Tulsa Geological Society, Tulsa, Oklahoma, has elected new officers: president, LOUIS H. LUKERT, division geologist, Texas Company; 1st vice-president, DANIEL A BUSCH, research geologist, Carter Oil Company; 2d vice-president, JOHN M. NASH, Shell Oil Company, Inc.; secretary-treasurer, MARY WHITEHEAD, Stanolind Oil and Gas Company; editor, OSCAR E. WAGNER, JR., Mid-Continent Petroleum Corporation; business manager, V. L. FROST, Ohio Oil Company; members of council, JOSEPH A. SHARPE, Frost Geophysical Corporation, JACK M. COPASS, consultant, and L. MURRAY NEUMANN, consultant.

The officers of the Shreveport Geological Society for the 1949–1950 term are as follows: president, VICTOR P. GRAGE, consulting geologist, 413 Ardis Building; vice-president, R. T. WADE, Schlumberger Well Surveying Corporation, Box 92; secretary-treasurer, CHARLES A. HICKOX, professor of geology at Centenary College.

The Mississippi Geological Society, Jackson, Mississippi, announces the following newly elected officers: president, E. T. MONSOUR, consultant, Box 2571, West Jackson; vice-president, CHARLES E. BUCK, Skelly Oil Company; secretary, F. T. HOLDEN, Carter Oil Company; treasurer, W. H. KNIGHT, Union Producing Company.

THEODORE A. LINK, A.A.P.G. vice-president, and consulting geologist of Toronto and Calgary, Canada, spoke on "Oil Developments in Western Canada," at the 26th annual meeting of the National Oil Scouts and Landmen's Association, at Houston, June 9–11.

The Pacific Section of the A.A.P.G., at Los Angeles, California, June 2, heard MARION E. DICE, General Petroleum Corporation economist, on "The Changing Outlook for Petroleum in the West."

ERIC A. RUDD has resigned from the position of chief geologist of the Broken Hill Prop. Co., Ltd., of Melbourne. He has taken the chair of mining and economic geology at the Adelaide University. The hope is expressed that this will later form the center for the teaching of petroleum geology on the continent of Australia.

MARVIN LEE is chief geologist of the Cooperative Refinery Association, 405 East 13th Street, Kansas City, Missouri.

F. M. HAMMER has resigned from the Stanolind Oil and Gas Company and is associated with the Schermerhorn Oil Corporation, Kennedy Building, Tulsa, Oklahoma.

WYOMING GEOLOGICAL ASSOCIATION FOURTH ANNUAL FIELD CONFERENCE, AUGUST 9–13, 1949

Place.—Powder River Basin, Wyoming. Ground operations will be confined to the west side of the Basin. Optional aerial reconnaissance trip will circle Wyoming portion of Basin, distance approximately 500 miles.

Dates.—August 9 (Tuesday) to August 13 (Saturday), inclusive.

Headquarters.—August 9 to 12:00 noon August 12: Sheridan Inn, Sheridan, Wyoming. August 12 and 13: Henning Hotel, Casper, Wyoming.

Hotel reservations.—Reservations will be arranged by the conference committee for the nights of August 9, 10, and 11 in Sheridan, and for the night of August 12 in Casper for those so requesting. It will be necessary to assign two and three persons to the same room, but it is not anticipated that it will be necessary to request two persons to share the same bed. It is expected that all persons can be accommodated in hotels and tourist courts.

Transportation.—Transportation will be in private automobiles. Automobiles will be available for persons requiring transportation from Casper to Sheridan, August 9. The conference will terminate in Casper.

Baggage.—The only baggage transfer necessary during the conference will be on August 12, from Sheridan to Casper. The committee will arrange the transfer.

Mail and telegrams.—All communications during the conference should be addressed in care of the Wyoming Geological Association: August 9, 10, and 11—Sheridan Inn, Sheridan, Wyoming; August 12 and 13—Henning Hotel, Casper, Wyoming.

Registration fee.—The registration fee will be $10.00. This will include one copy of the Guide Book.

Guide books.—The Guide Book will contain a road log for the trip and logs for all principal roads of the Powder River Basin, papers on regional stratigraphy and structure, papers on oil and gas fields, maps, sections and photographs. Each registrant will receive one Guide Book at the time of registration. Extra copies will be available then at $5.00 per copy. After the conference, Guide Books will be available from the Treasurer, Wyoming Geological Association, Box 545, Casper, Wyoming, at $5.00 per copy, postpaid.

Aerial reconnaissance trip.—Since the vast size of the Powder River Basin and the time available make coverage by ground trips impossible, optional aerial reconnaissance trips will be provided on August 13. Each flight will be from Casper north over Salt Creek to Sheridan, thence southeast across the Powder River Basin and along the east flank to Mush Creek, south to Lance Creek, and west to Casper. The distance is about 500 miles, the time about 3 hours. All planes will be commercial aircraft DC-3's and/or DC-4's. The committee will provide a geologist guide on each flight, and the flight line and features ol

interest will be shown on a Guide Book map. For those who prefer, optional automobile trips will be provided out of Casper on August 13. An exact price of the flight can not be quoted at this time. The maximum figure is $32.00 per person, but this can be considerably lowered by large participation in the reconnaissance trip and especially by participation in the charter (or special section) flights from Denver to Sheridan on August 9 and from Casper to Denver on August 13. After receipt of the registration application the conference committee will be able to arrive at the flight costs and will announce them well in advance of the conference to those who wish to participate.

Registration application form.—If you plan to attend the conference, request a Registration Application Form from George Goodin, Wyoming Geological Association, Box 545, Casper, Wyoming. Your application must be accompanied by $5.00, this amount to be applied to your registration fee at the time of registration on August 9. You may cancel your reservations at any time until August 8, and your money will be refunded. After that date no refund will be made.

Limitation of number of participants.—Because of heavy tourist traffic and limited accommodations, it will be necessary to limit the number of registrations to 300.

George Goodin,
Field Conference Committee Mail Address: Box 545, Casper, Wyoming
Telegraph Address: Petroleum Information, Casper, Wyoming

At a meeting of the Oklahoma City Geological Society, May 26, 1949, the following officers were elected to serve for the year 1949–1950: president, Rizer Everett, Carter Oil Company; vice-president, Richard L. Roberts, Vickers Petroleum Company; secretary, L. W. Curtis, Sohio Petroleum Company; treasurer, Joe M. Spears, independent.

The tentative program for the 3-day commemoration of the 75th anniversary of the Colorado School of Mines, at Golden, Colorado, September 29 and 30 and October 1, 1949, includes conferences on the general theme, "Mineral Resources in World Affairs." The sessions on "Petroleum Geology and Engineering Geology," scheduled for September 30 and October 1, include the following papers.

"Petroleum in Colorado," C. E. Dobbin, United States Geological Survey, Denver.
"New Techniques in Petroleum Exploration," G. F. Kaufmann, Standard Vacuum Oil Company, New York City.
"Photogeology in Petroleum Exploration," Robert McMillan, Geophoto Services, Inc., Denver.
"Application of Geology in the Discovery and Development of Underground Water Resources," A. N. Sayre, United States Geological Survey, Washington.
"Application of Geology in Soil Conservation," Maurice Donnelly, United States Soil Conservation Service, Riverside, California.
"Application of Geology in Engineering Design and Construction," R. D. Dirmeyer, United States Bureau of Reclamation, Casper, Wyoming.

Sessions on "Petroleum Production" include the following.

"The Valuation of Oil Properties for Secondary Operation," R. C. Earlougher, Tulsa, Oklahoma.
"General Factors and Consideration of Secondary Recovery Operations in the Petroleum Industry," Paul D. Torrey, Houston, Texas.
"The Drilling, Producing, and Valuation of Distillate Fields," Philip C. Dixon, Houston, Texas.
"Operation in Hydrogen Sulphide Gas Field near Worland, Wyoming," Max Loy and Robert Corbett, Sharples Corporation, Denver.

"Application of Oil Well Surveying Methods and Directional Drilling," a representative of the Eastman Oil Well Survey Company, Denver.

"Petroleum Conservation and Conservation Laws," D. V. CARTER, vice-president in charge of production, Magnolia Petroleum Company, Dallas, Texas.

Geophysical papers are the following.

"Correlation of Field Problems with Fundamental Research," CECIL H. GREEN, vice-president, Geophysical Service Company, Dallas.

"Correlation of Geophysical Results with Geological Structure," R. CLARE COFFIN, Stanolind Oil and Gas Company, Tulsa.

"Current Trends and Progress in Mining Geophysics," HANS LUNDBURG, president, Lundburg Explorations, Toronto, Canada.

"Well-Logging Techniques," H. G. DOLL and MAURICE MARTIN, Schlumberger Well Surveying Corporation, Houston, Texas.

Nine papers on the *Stratigraphy of Alberta Basin, Canada*, published in the April *Bulletin*, have been prepared in the form of a paper-covered separate for the convenience of those interested in the Alberta region. This reprinted symposium sells at $1.50 per copy ($1.00 to members and associates). Write A.A.P.G. Headquarters, Box 979, Tulsa 1, Oklahoma.

The book *Problems of Petroleum Geology*, a Sequel to Structure of Typical American Oil Fields, is being reprinted this summer. This book was published by the Association under the editorship of W. E. WRATHER and F. H. LAHEE in 1934. The supply was sold out in 1938, and continued requests for reprinting have come from college geology departments and oil-company offices. The reprint will be made by offset process and bound in cloth cover. The book contains 43 papers by 47 authors; 1073 pages; 200 illustrations. It is planned to hold the price to $5.00 ($4.00 to members and associates). Write A.A.P.G. Headquarters, Box 979, Tulsa 1, Oklahoma.

At the steak dinner of the Rocky Mountain Association of Geologists, at Denver, Colorado, June 1, ROBERT F. THURRELL, JR., of Geophoto Services, spoke on "Oil Exploration in the Arctic."

A. ALLEN WEYMOUTH, formerly with the Standard Oil Company of Texas at Houston, is with the American Independent Oil Company, 111 Sutter Street, San Francisco, California.

ROBERT C. PENDERGRAFT has changed his address from the United Fruit Company, Almirante, Panama, to 510 Booker Street, Little Rock, Arkansas.

FREDERICK L. STEAD is instructor in geology at the University of Texas, Austin.

MELVIN M. FENICHELL is with the United States Geological Survey, F.W.A. Building, Washington, D. C.

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MEMORIAL

THOMAS RUSSELL BANKS

(1900–1948)

Thomas Russell Banks was killed while on a business trip near Freer, Duval County, Texas, on September 22, 1948. His wife, Mrs. Dorothy Burr Banks of San Antonio, Texas, and his mother, Mrs. L. C. Banks of Austin, Texas, survive him.

Thomas Russell Banks was born near Webberville, Travis County, Texas, on August 17, 1900, son of Flora (Dew) Banks and Lewis Clarke Banks. His life-long enjoyment of outdoor life and camping trips which led him to many out-of-the-way places for hunting and fishing was an outgrowth of his boyhood which was spent on the Colorado River that bordered his father's farm. Tom attended the public schools at Austin, Texas, where he graduated from high school, and subsequently entered the University of Texas, majoring in geology. During his undergraduate years at the University of Texas he worked for the Bureau of Economic Geology, under the direction of E. H. Sellards. Tom received his Bachelor of Arts degree in 1923, and was immediately employed by the Sinclair Oil and Refining Company, with headquarters in Houston. After about 6 months of work with the Sinclair, he joined the geological department of the Humble Oil and Refining Company.

Tom was married on June 23, 1924, to Dorothy Burr and they lived first in Houston, and then in many other places, wherever the requirements of his work dictated. When working for the Humble Oil and Refining Company he was engaged mostly in surface mapping on the Texas and Louisiana Gulf Coast. In 1926 Tom joined the geological staff of the Vacuum Oil Company and most of his work consisted of surface and subsurface geology in the Texas and Louisiana Gulf Coast, central and western Texas. One summer was spent in geological work in western New York.

A large part of Tom's surface work with the Vacuum was in Duval County, where that company had extensive leasehold interests. Tom began this work under the able direction of E. Jablonski and when Dr. Jablonski was transferred to New York in 1930 Tom continued this work. As a result of his many years of experience, he probably knew as much about the surface and subsurface geology in the Laredo area as any geologist in South Texas. When the Vacuum Oil Company and Standard Oil Company of New York were merged in 1931, the merged companies operated in the southwest as the Magnolia Petroleum Company, and Tom worked under the direction of the San Antonio district office. Because of his ability and experience it was determined by the management of the Magnolia Petroleum Company, at which time Sheridan A. Thompson was chief geologist, that Tom would be promoted to the position of district geologist for that company at Wichita Falls. He continued in that capacity until 1936 and acquired valuable experience in the geology of the Texas Panhandle and North Texas.

Tom preferred work in South Texas to that in any other area in the state, and, when he received an offer to work for some independents in South Texas, he resigned from the position in Wichita Falls to accept this appointment. In 1937, he accepted a position as division geologist at San Antonio for the Transwestern Oil Company. He assisted the Transwestern Oil Company in obtaining production in several fields, but it was especially through his efforts that the Glen field in Webb County was discovered by the Transwestern. In 1940 Tom resigned his position with the Transwestern to work independently and use his knowledge of geology in business for which he had a natural aptitude. He was

Thomas Russell Banks

successful in acquiring a number of producing royalties, and he continued independent work until his untimely death.

Tom and Dorothy were members of the Christ Episcopal Church of San Antonio. His many friends miss the genial and affable Tom.

B. Coleman Renick

San Antonio, Texas
May 16, 1949

PROFESSIONAL DIRECTORY

CALIFORNIA

WALKER S. CLUTE
Geologist and Petroleum Engineer
509 Havenstrite Oil Building
811 West Seventh Street
LOS ANGELES 14, CALIFORNIA

E. FRED DAVIS
Geologist
1203 Hollingsworth Building
606 South Hill Street
TUcker 1729 LOS ANGELES 14

PAUL P. GOUDKOFF
Geologist
Geologic Correlation by Foraminifera and Mineral Grains
799 Subway Terminal Building
LOS ANGELES, CALIFORNIA

LUIS E. KEMNITZER
KEMNITZER, RICHARDS AND DIEPENBROCK
Geologists and Petroleum Engineers
1003 Financial Center Building
704 South Spring Street
LOS ANGELES 14, CALIFORNIA

A. I. LEVORSEN
Petroleum Geologist
STANFORD UNIVERSITY CALIFORNIA

HENRY SALVATORI
Western Geophysical Company
711 Edison Building
601 West Fifth Street
LOS ANGELES, CALIFORNIA

DREXLER DANA
Geologist and Petroleum Engineer
Telephone Bakersfield 4-4173
Route 7, 410 Fairway Drive
Bakersfield, California

EVERETT C. EDWARDS
Geologist
501 South Coast Boulevard
Telephone 1332 Laguna Beach, California

HAROLD W. HOOTS
Geologist
555 South Flower
LOS ANGELES 13 CALIFORNIA

VERNON L. KING
Petroleum Geologist and Engineer
707 South Hill Street
LOS ANGELES, CALIFORNIA
Vandike 7087

ERNEST K. PARKS
Consultant in
Petroleum and Natural Gas Development
and
Engineering Management
614 S. Hope St.
LOS ANGELES, CALIFORNIA

RICHARD L. TRIPLETT
Core Drilling Contractor
1660 Virginia Road
PArkway 9925 LOS ANGELES 6, CALIF.

CANADA

THEO. A. LINK
Geologist
31st Floor
25 King Street West
Toronto 1, Ontario
Elgin 7313
810A First Street West
Calgary, Alberta
Main 3005
CANADA

COLORADO

DUNN AND BOREING
Petroleum Geologists
BURTON C. DUNN
M. J. BOREING
208 Newman Building
DURANGO, COLO.

COLORADO

C. A. HEILAND
Heiland Research Corporation
130 East Fifth Avenue
DENVER 9, COLORADO

CLARENCE E. MANION
Consulting Geologist
1740 Grape Street, Denver, Colo.
Phone Fremont 2234

HARRY W. OBORNE
Geologist
620 East Fontanero Street
Colorado Springs, Colorado
Main 4711

EVERETT S. SHAW
Geologist and Engineer
3141 Zenobia Street
DENVER 12 . COLORADO

EDWARD C. SIMPSON
Geologist
620 Cherry Street
DENVER 7, COLORADO

V. ZAY SMITH L. BRUNDALL
R. McMILLAN A. R. WASEM
Geophoto Services
Photogeologists and Consulting Geologists
305 E & C Building DENVER 2, COLO.

ILLINOIS

C. E. BREHM
Consulting Geologist
and Geophysicist
New Stumpp Building, Mt. Vernon, Illinois

J. L. McMANAMY
Consulting Geologist
Mt. Vernon, Illinois

L. A. MYLIUS
Geologist *Engineer*
Yancey Building 102½ E. Broadway
Box 264, Centralia, Illinois

T. E. WALL
Geologist
Mt. Vernon Illinois

INDIANA

HARRY H. NOWLAN
Consulting Geologist and Engineer
Specializing in Valuations
Evansville 19, Indiana
317 Court Bldg. Phone 2-7818

KANSAS

EDWARD A. KOESTER
Petroleum Geologist
302 Orpheum Bldg., Wichita, Kansas

KANSAS

WENDELL S. JOHNS
PETROLEUM
GEOLOGIST
Office Phone 3-1540 600 Bitting Building
Res. Phone 2-7266 Wichita 2, Kansas

LOUISIANA

GORDON ATWATER
Consulting Geologist
Whitney Building
New Orleans Louisiana

LOUISIANA

WILLIAM M. BARRET, INC.
Consulting Geophysicists
Specializing in Magnetic Surveys
Giddens-Lane Building SHREVEPORT, LA.

MISSISSIPPI

R. Merrill Harris Willard M. Payne
HARRIS & PAYNE
Geologists
100 East Pearl Bldg. Phone 4-6286
Jackson, Miss. or L. D. 89

MISSISSIPPI

G. JEFFREYS
Consulting Geologist
Box 2415
West Jackson 117, Miss.
100 East Pearl St. Phone 3-2285

FREDERICK F. MELLEN
Consulting Geologist
P.O. Box 2584
West Jackson Station
Jackson, Mississippi
113½ W. Capitol Street Phone 54541

E. T. MONSOUR
Consulting Geologist
P.O. Box 2571
West Jackson Station
Jackson, Mississippi
112½ E. Capitol St. Phone 2-1368

G. W. GULMON N. W. JOHNS
GULMON AND JOHNS
Petroleum Geologists
Byrnes Bldg. NATCHEZ, MISS. Phone 735

MONTANA

HERBERT D. HADLEY
Petroleum Geologist
Billings, Montana
801 Grand Ave. Phone 2950

NEW MEXICO

VILAS P. SHELDON
Consulting Geologist
Office Phone 720-W Carper Building
Home Phone 702-J Artesia, New Mexico

NEW MEXICO

SHERMAN A. WENGERD
Petroleum Geologist
University Station
Albuquerque Telephone 8861
New Mexico Ext. 31

NEW YORK

BROKAW, DIXON & McKEE
Geologists *Engineers*
OIL—NATURAL GAS
Examinations, Reports, Appraisals
Estimates of Reserves
120 Broadway Gulf Building
New York Houston

NEW YORK

BASIL B. ZAVOICO
Petroleum Geologist and Engineer
220 E. 42nd St. City National Bank Bldg.
New York 17, N.Y. Houston, Texas
MUrray Hill 7-7591 Charter 4-6923

OHIO

JOHN L. RICH
Geologist
General Petroleum Geology
Geological Interpretation of Aerial Photographs
University of Cincinnati
Cincinnati, Ohio

OHIO

GORDON RITTENHOUSE
Geologist
Specializing in sedimentation and sedimentary petrology
University of Cincinnati
Cincinnati 21, Ohio

OKLAHOMA

ELFRED BECK
Geologist
821 Wright Building Box 55
TULSA, OKLA. DALLAS, TEX.

OKLAHOMA

CRAIG FERRIS
Geophysicist
E. V. McCollum & Co.
515 Thompson Bldg.
Tulsa 3, Okla.

E. J. HANDLEY
Vice-President
CENTURY GEOPHYSICAL CORPORATION
Phone 5-1171
1333 North Utica Tulsa 6, Okla

R. W. LAUGHLIN
WELL ELEVATIONS
LAUGHLIN-SIMMONS & CO.
615 Oklahoma Building
TULSA OKLAHOMA

FRANK A. MELTON
Consulting Geologist
Aerial Photographs
and Their Structural Interpretation
1010 Chautauqua Norman, Oklahoma

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CASPER, WYOMING

Source Data

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By

J. V. HOWELL AND A. I. LEVORSEN
Tulsa, Oklahoma, and Stanford University, California

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- A. Publications and non-commercial publishing agencies, regional, national, and continental
- B. Bibliographies, general
- C. Dictionaries, glossaries, encyclopedias, statistics, handbooks
- D. Miscellaneous books and publications of general geological interest
- E. Commercial map publishers
- F. Regional and national geologic and physiographic maps
- G. State and Province geological maps
- H. Trade journals: oil, gas, mineral industry
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- A. Canada, by provinces, and Newfoundland
- B. Central American countries
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THE AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS
BOX 979, TULSA 1, OKLAHOMA, U.S.A.

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Los Angeles 54

Monthly meetings. Visiting geologists are welcome.

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Meetings will be announced. Visiting geologists and friends are welcome.

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Meetings will be announced.

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Vice-President - - - - - - - - T. G. Wright
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Secretary-Treasurer - - - - Victor F. Reiserer
Superior Oil Company, 510 K.F.H. Bldg.

Regular Meetings: 7:30 P.M., Geological Room, University of Wichita, first Tuesday of each month. Noon luncheons, first and third Monday of each month at Wolf's Cafeteria. The Society sponsors the Kansas Well Log Bureau, and the Kansas Well Sample Bureau, 508 East Murdock. Visiting geologists and friends welcome.

LOUISIANA

NEW ORLEANS GEOLOGICAL SOCIETY
NEW ORLEANS, LOUISIANA

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Vice-President and Program Chairman - - - - - - - - - - - - - M. N. Broughton
The Texas Company, 1500 Canal Building
Secretary-Treasurer - - - - - H. A. Nystrom
Schlumberger Well Surveying Corporation
452 Canal Building

Meets the first Monday of every month, October-May, inclusive, 12 noon, St. Charles Hotel. Special meetings by announcement. Visiting geologists cordially invited.

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Vice-President - - - - - - - - R. T. Wade
Schlumberger Well Surveying Corporation
Box 92
Secretary-Treasurer - - - - Charles A. Hickox
Centenary College

Meets monthly, September to May, inclusive, in the State Exhibit Building, Fair Grounds. All meetings by announcement.

LOUISIANA

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Treasurer - - - - - - - - - Bert C. Timm
Magnolia Petroleum Company

Meetings: Dinner and business meetings third Tuesday of each month at 7:00 P.M. at the Majestic Hotel. Special meetings by announcement. Visiting geologists are welcome.

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Business Manager - - - Kenneth G. Walsworth
Dept. Conservation, Box 176

Meetings: Monthly, November through May, at Michigan State College, East Lansing, Michigan. Informal dinners at 6:30 P.M. Papers follow dinner. Visitors welcome.

MISSISSIPPI

MISSISSIPPI GEOLOGICAL SOCIETY
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Carter Oil Company, Box 1490

Meetings: First and third Thursdays of each month, from October to May, inclusive, at 7:30 P.M., the Edwards Hotel, Jackson, Mississippi. Visiting geologists welcome to all meetings.

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Meetings by announcement to members. Visiting geologists and friends cordially invited.

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Vice-President - - - - - - Earl Westmoreland
Seaboard Oil Company

Secretary-Treasurer - - - - - - Frank Millard
Schlumberger Well Surveying Corp., Box 747

Dinner meetings will be held at 7:00 P.M. on the first Wednesday of every month from October to May, inclusive, at the Ardmore Hotel.

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Secretary - - - - - - - - - - - L. W. Curtis
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Treasurer - - - - - - - - - Joseph M. Sears
Independent

Meetings: Technical program each month, subject to call by Program Committee, Oklahoma City University, 24th Street and Blackwelder. Luncheons: Every second and fourth Thursday of each month, at 12:00 noon, Y.W.C.A.

OKLAHOMA

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Box 1007, Shawnee

Secretary-Treasurer - - - - - Marcelle Mousley
Atlantic Refining Company, Box 169
Shawnee

Meets the fourth Thursday of each month at 8:00 P.M., at the Aldridge Hotel. Visiting geologists welcome.

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Business Manager - - - - - - - V. L. Frost
Ohio Oil Company, Thompson Building

Meetings: First and third Mondays, each month, from October to May, inclusive, at 8:00 P.M., University of Tulsa, Lorton Hall. Luncheons: Every Friday (October-May), Chamber of Commerce Building.

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Box 2038

Secretary - - - - - - - - - James C. Patton
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610 Wood St.

Treasurer - - - - - - - - - Sidney S. Galpin
Peoples Natural Gas Company
545 William Penn Place

Meetings held each month, except during the summer. All meetings and other activities by special announcement.

TEXAS

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Skelly Oil Company

Meetings: 2d Thursday of each month, 7:30 P.M., Wooten Hotel.

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Pure Oil Company

Secretary-Treasurer - - - - - - James D. Burke
Seaboard Oil Company of Delaware, Box 601

Regular luncheons, every Thursday, Terrace Annex Room, Robert Driscoll Hotel, 12:00. Special night meetings by announcement.

DALLAS GEOLOGICAL SOCIETY
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Vice-President - - - - - - - - H. V. Tygrett
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P.O. Box 2819

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Consulting, 501 Continental Building

Executive Committee - - - - - - Edgar Kraus
Atlantic Refining Company
Box 2819

Meetings: Monthly luncheons and night meetings by announcement.

EAST TEXAS GEOLOGICAL SOCIETY
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Stanolind Oil and Gas Company
Box 660

Vice-President - - - - - - - Howard H. Hester
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Secretary-Treasurer - - - - - Rosella L. Bunch
Shell Oil Company, Inc., Box 2037

Luncheons: Each week, Monday noon, Blackstone Hotel.
Evening meetings and programs will be announced. Visiting geologists and friends are welcome.

FORT WORTH GEOLOGICAL SOCIETY
FORT WORTH, TEXAS

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Stanolind Oil and Gas Company
Box 1410

Vice-President - - - - - - - H. C. Vanderpool
Texas Pacific Coal and Oil Company
Box 2110

Secretary-Treasurer - - - - Thomas Nichols
Rowan Oil Company
Commercial Standard Building

Meetings: Luncheon at noon, Hotel Texas, first and third Mondays of each month. Visiting geologists and friends are invited and welcome at all meetings.

TEXAS

HOUSTON GEOLOGICAL SOCIETY
HOUSTON, TEXAS

President - - - - - - - - - A. F. Childers
Gulf Oil Corporation, Box 2100

Vice-President - - - - - Hershal C. Ferguson
Consultant, 935 Esperson Building

Secretary - - - - - - - - - - R. R. Rieke
Schlumberger Well Surveying Corporation

Treasurer - - - - - - - Mary L. Holland
Stanolind Oil and Gas Company

Regular meeting held the second and fourth Mondays at noon (12 o'clock), Mezzanine floor, Rice Hotel. For any particulars pertaining to the meetings write or call the secretary.

PANHANDLE GEOLOGICAL SOCIETY
AMARILLO, TEXAS

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Phillips Petroleum Company, Box 1761

Vice-President - - - - - - - Robert F. Herron
Oil Development Company, 900 Polk St.

Secretary-Treasurer - - - - - Robert B. Totten
Sun Oil Company, Box 46

Meetings: Luncheon 1st and 3rd Wednesdays of each month, 12:00 noon, Herring Hotel. Special night meetings by announcement.

NORTH TEXAS GEOLOGICAL SOCIETY
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Shell Oil Company, Inc., Box 2010

Vice-President - - - - - Ralph H. McKinlay
Panhandle Producing and Refining Company
Box 1191

Secretary-Treasurer - - - - Walter L. Ammon
Stanolind Oil and Gas Company
Box 1680

Meetings: Luncheon 1st and 3d Thursdays of each month, 12:00 noon, Texas Room, Holt Hotel. Evening meetings by special announcement. Visiting geologists and friends are cordially invited to all meetings.

SOUTH TEXAS GEOLOGICAL SOCIETY
SAN ANTONIO, TEXAS

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Shell Oil Company
2000 Alamo National Building

Vice-President - - - - - - - - J. Boyd Best
Ohio Oil Company

Secretary-Treasurer - - - Louis H. Haring, Jr.
Stanolind Oil and Gas Company

Meetings: One regular meeting each month in San Antonio. Luncheon every Monday noon at Milam Cafeteria, San Antonio.

TEXAS

WEST TEXAS GEOLOGICAL SOCIETY
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Honolulu Oil Corporation, Box 1391

Vice-President - - - - - Ralph D. Chambers
Continental Oil Company, Box 431

Secretary - - - - - - - - - Jesse A. Rogers
The Texas Company, Box 1270

Treasurer - - - - - - - John V. Norman, Jr.
Forest Oil Corporation, Box 1821

Meetings will be announced.

WYOMING

WYOMING GEOLOGICAL ASSOCIATION
CASPER, WYOMING
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Gulf Oil Corporation, Box 1971

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Morton Oil Company, Box 1970

2d Vice-President (Programs) - Donald E. Edstrom
British-American Oil Producing Company, Box 620

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Atlantic Refining Company

Treasurer - - - - - - - - - George L. Goodin
Petroleum Information, Inc.

Informal luncheon meetings every Friday, 12 noon, Townsend Hotel. Visiting geologists welcome. Special meetings by announcement.

WEST VIRGINIA

APPALACHIAN GEOLOGICAL SOCIETY
CHARLESTON, WEST VIRGINIA
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United Fuel Gas Company, Box 1273

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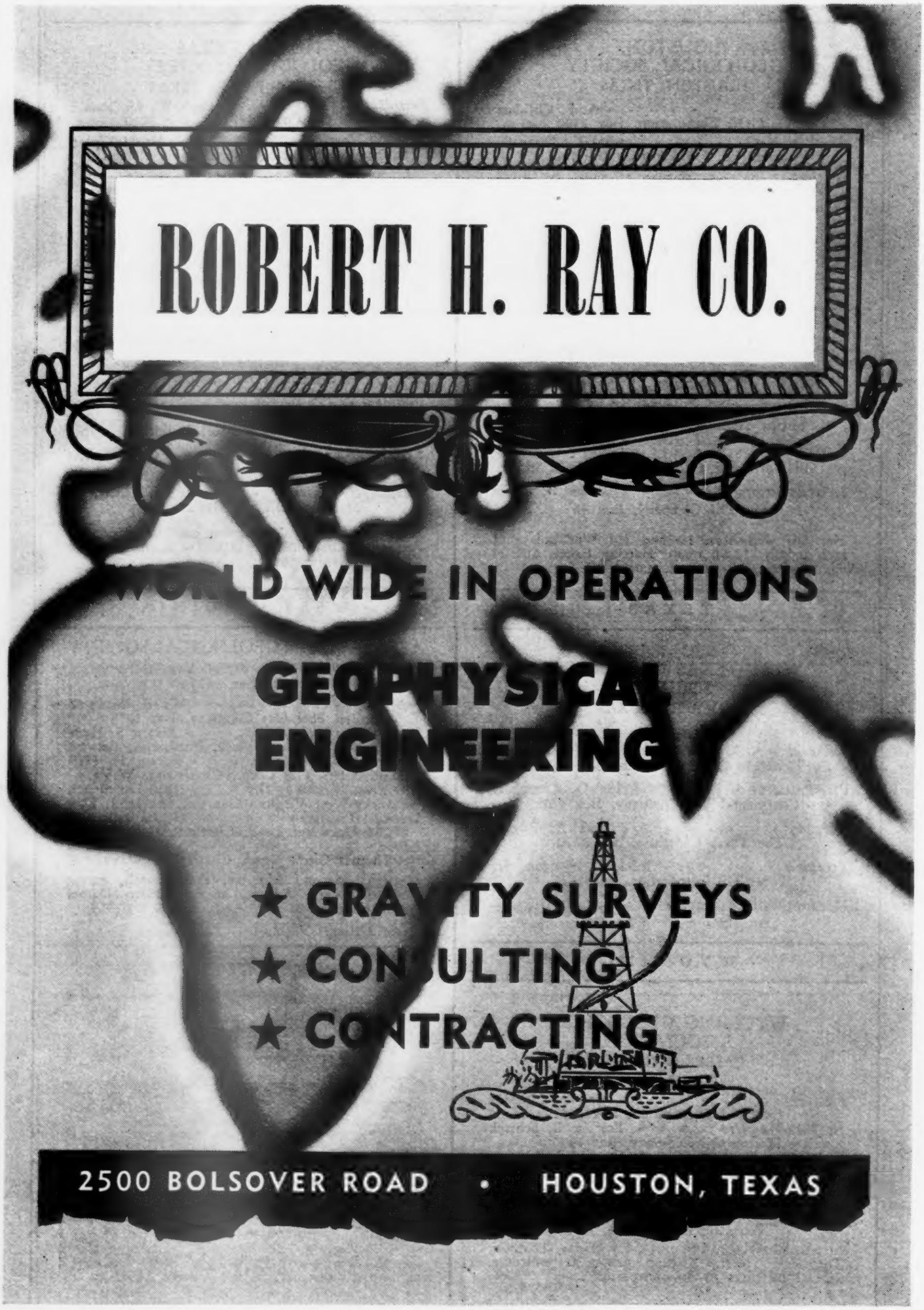
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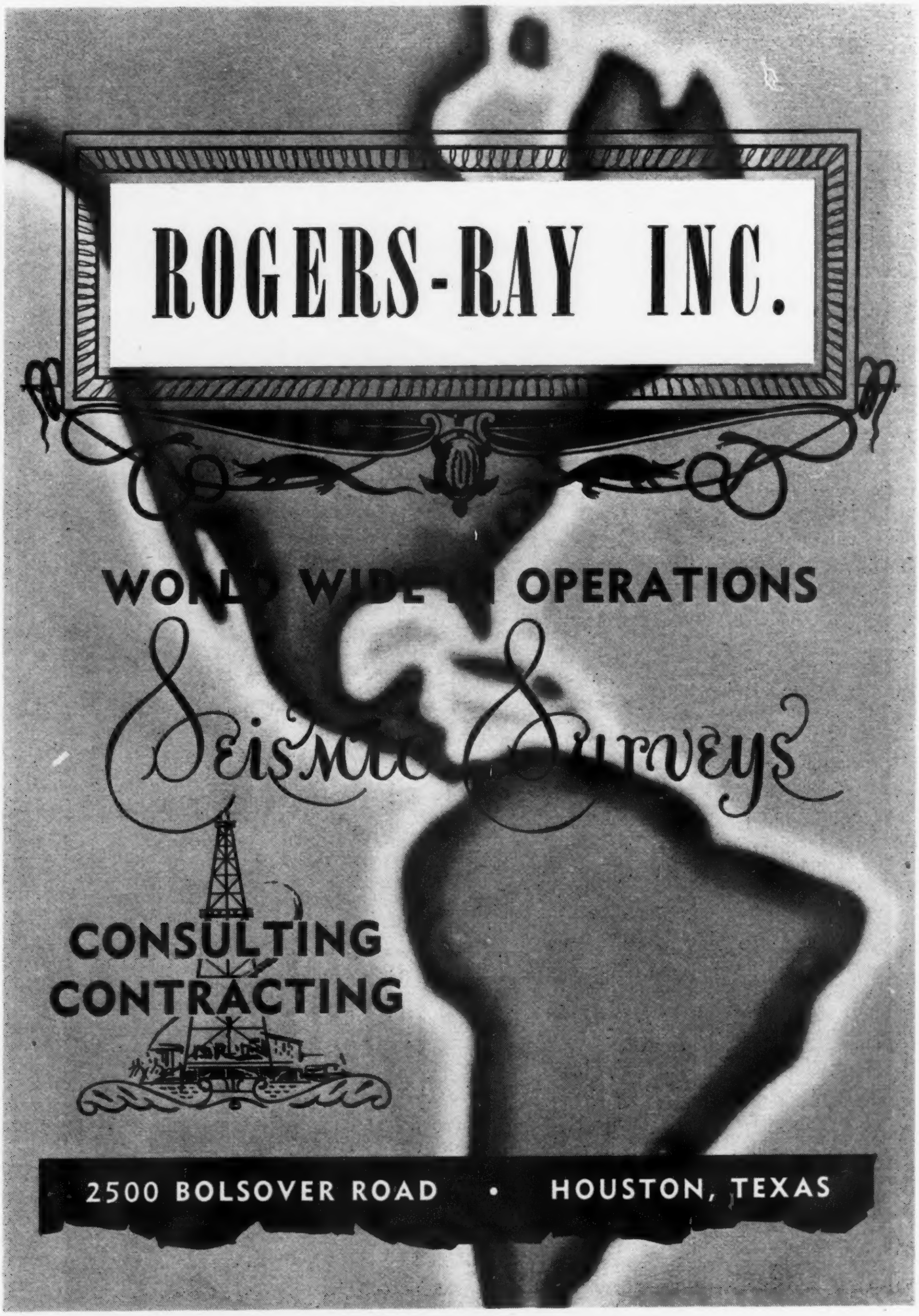
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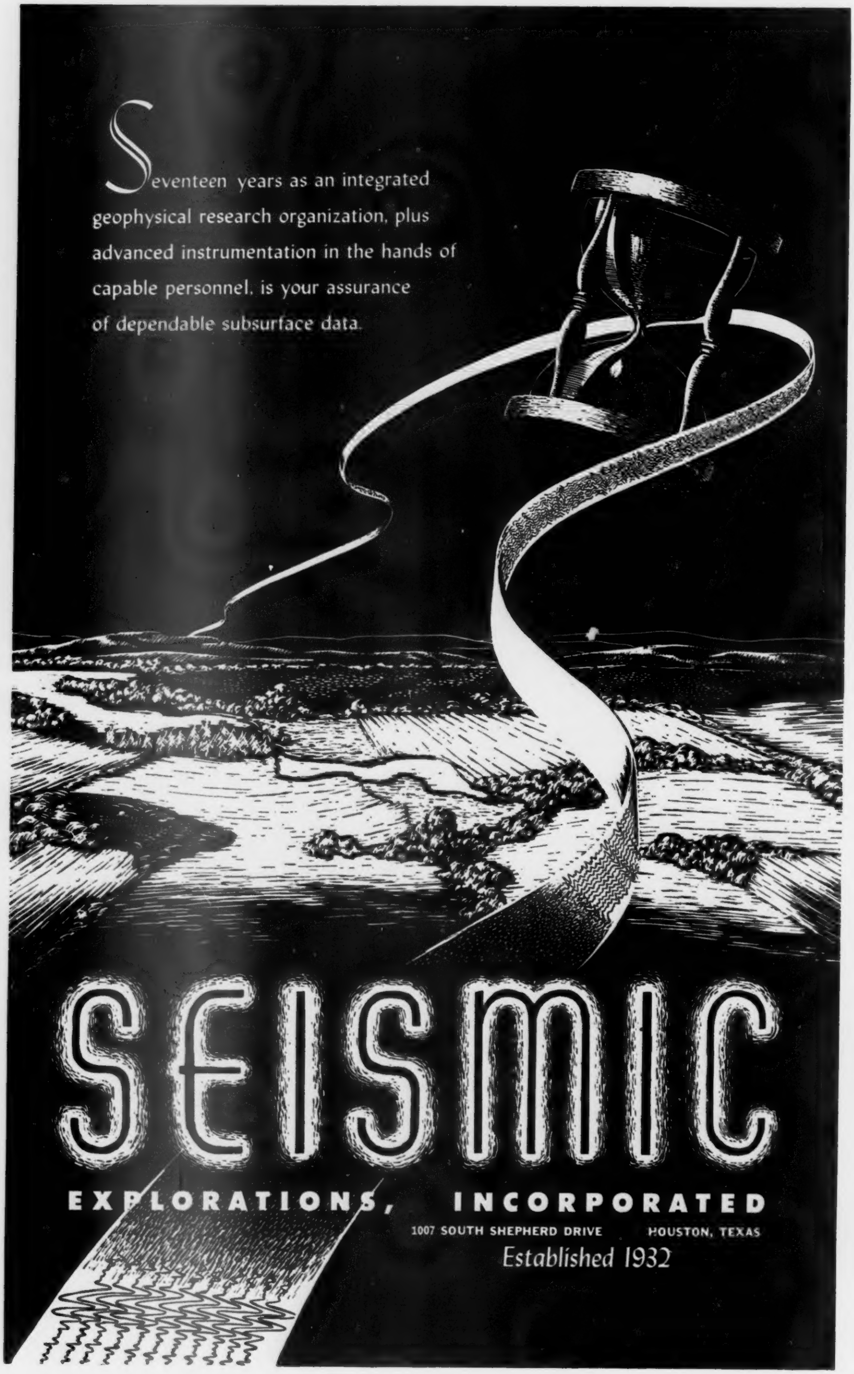
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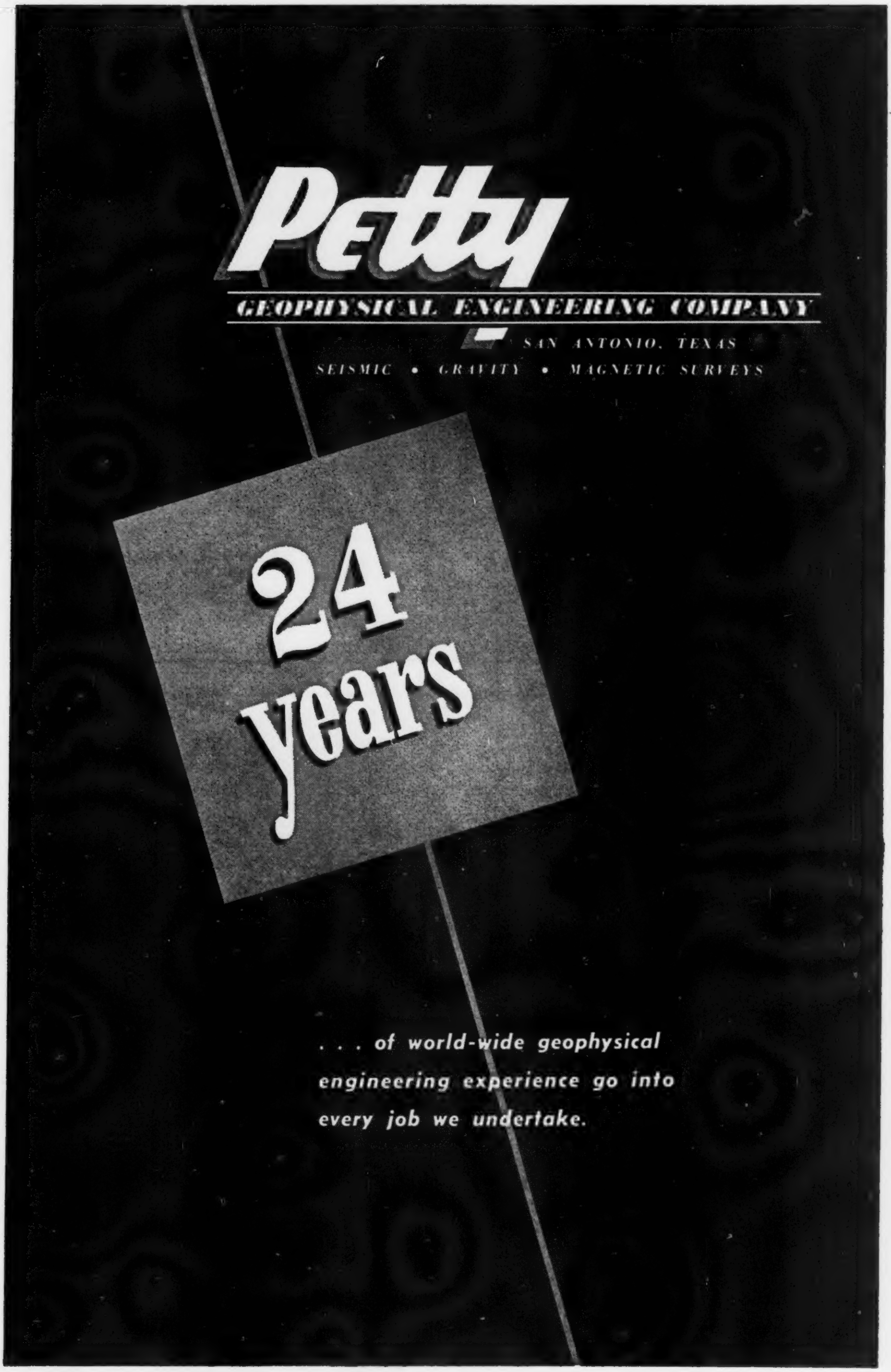
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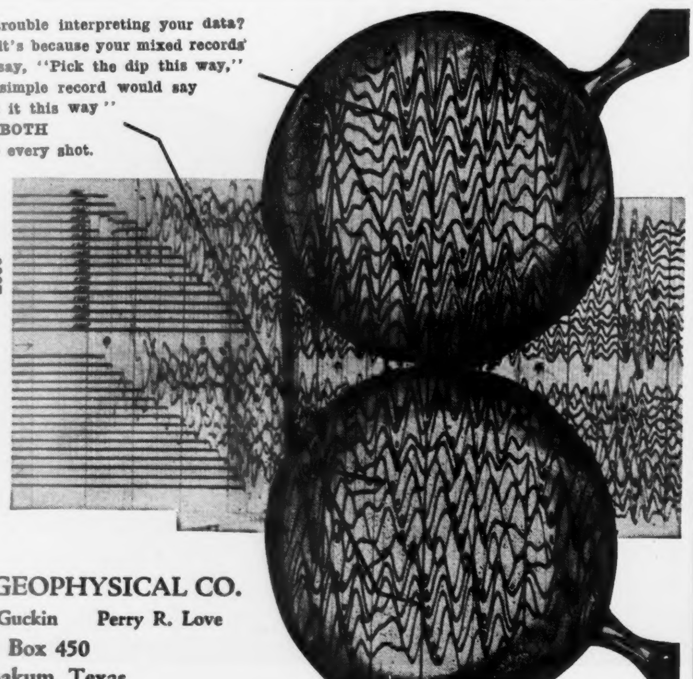

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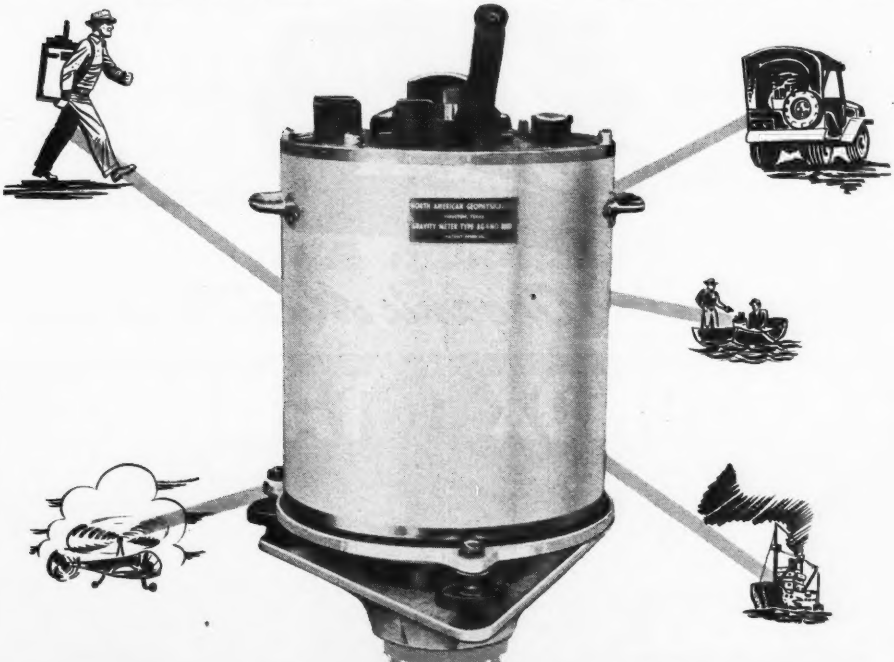

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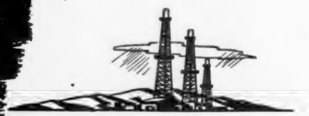

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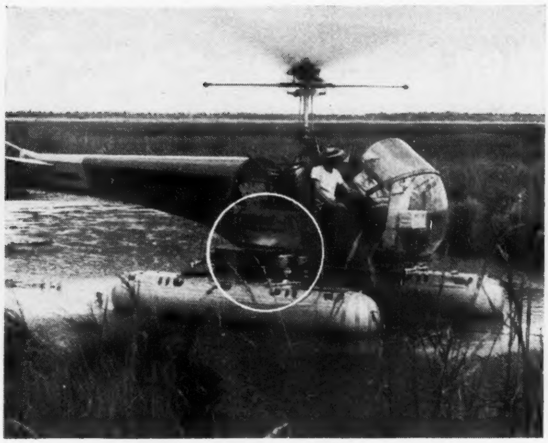

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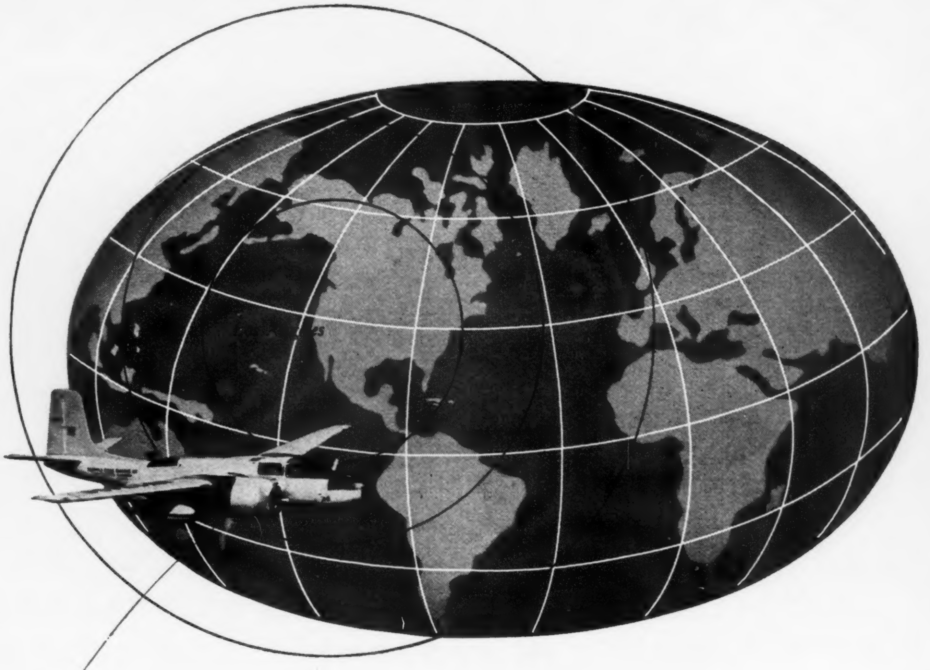

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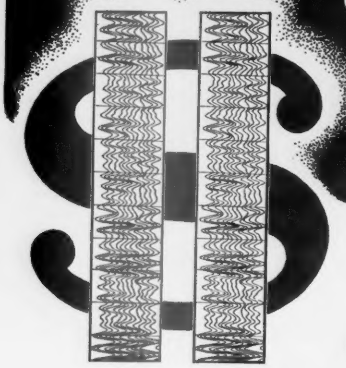

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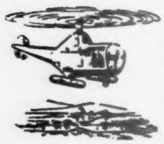

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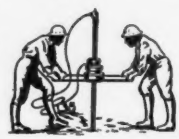

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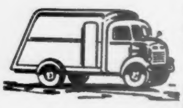

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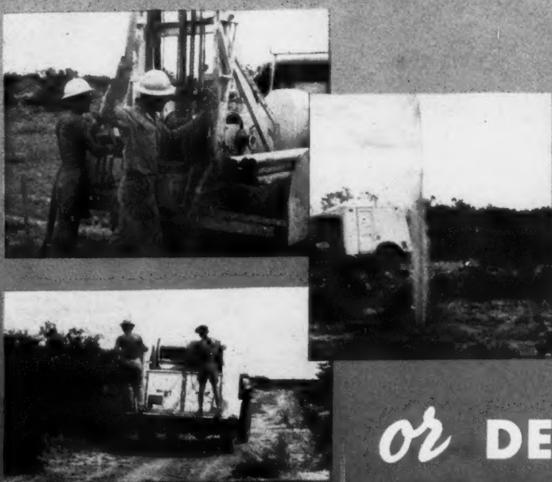

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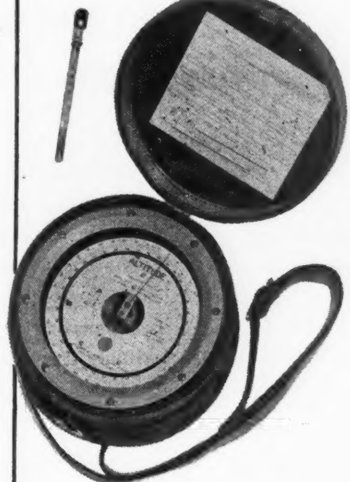

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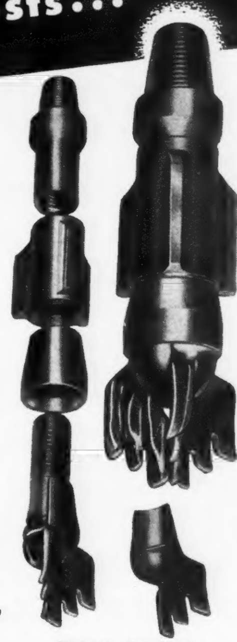

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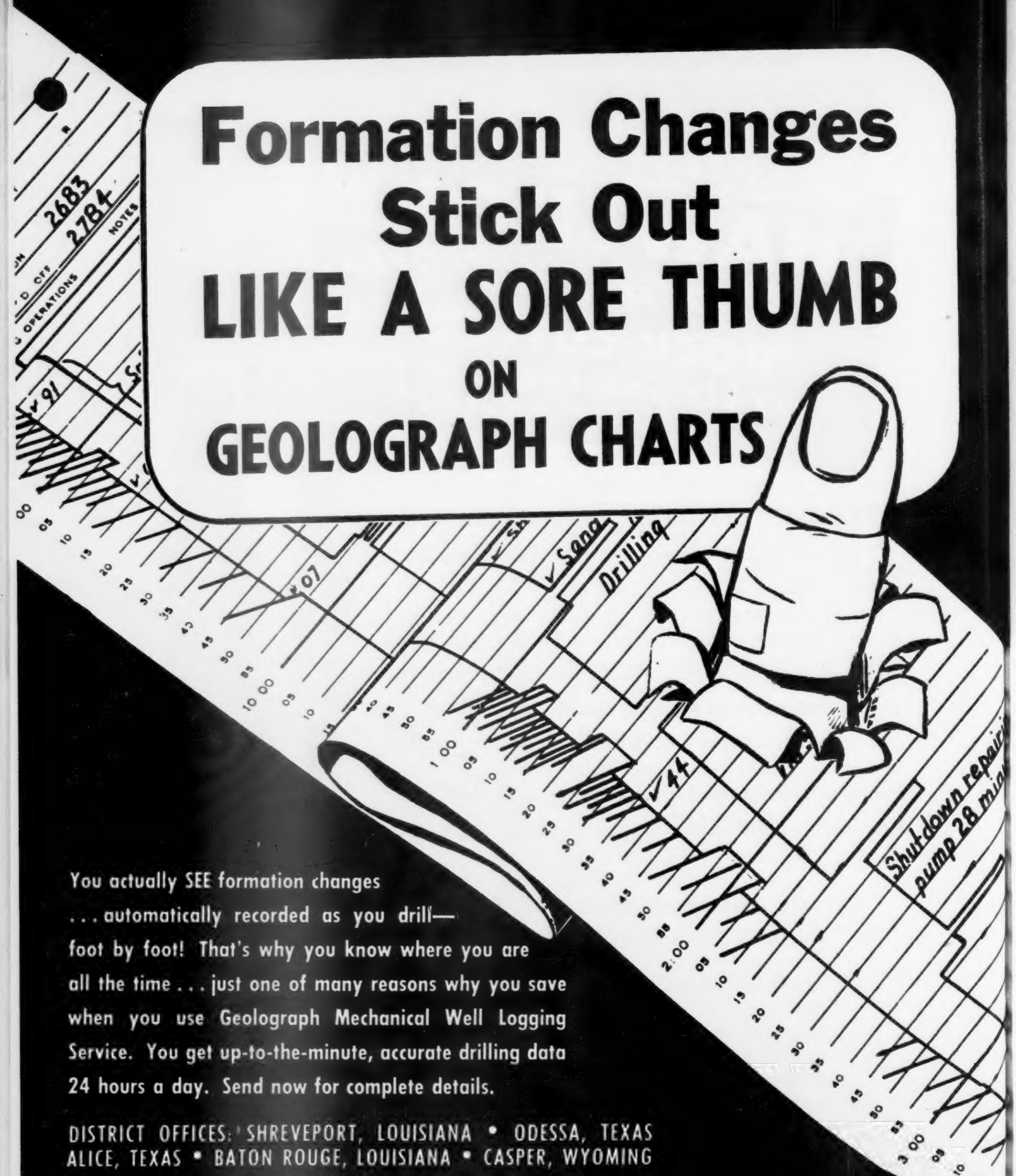

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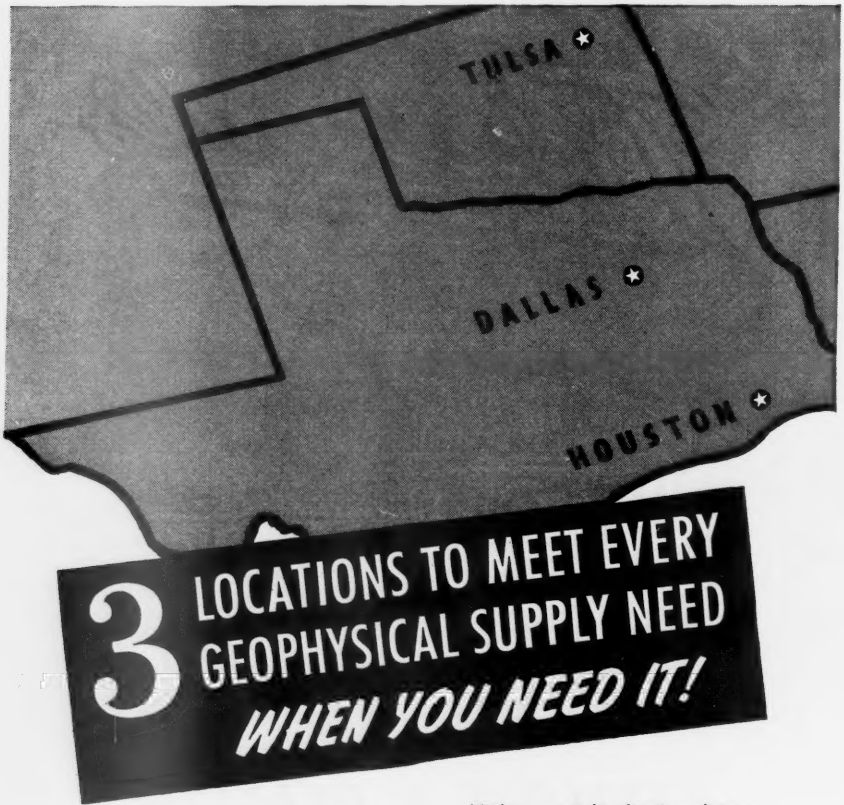

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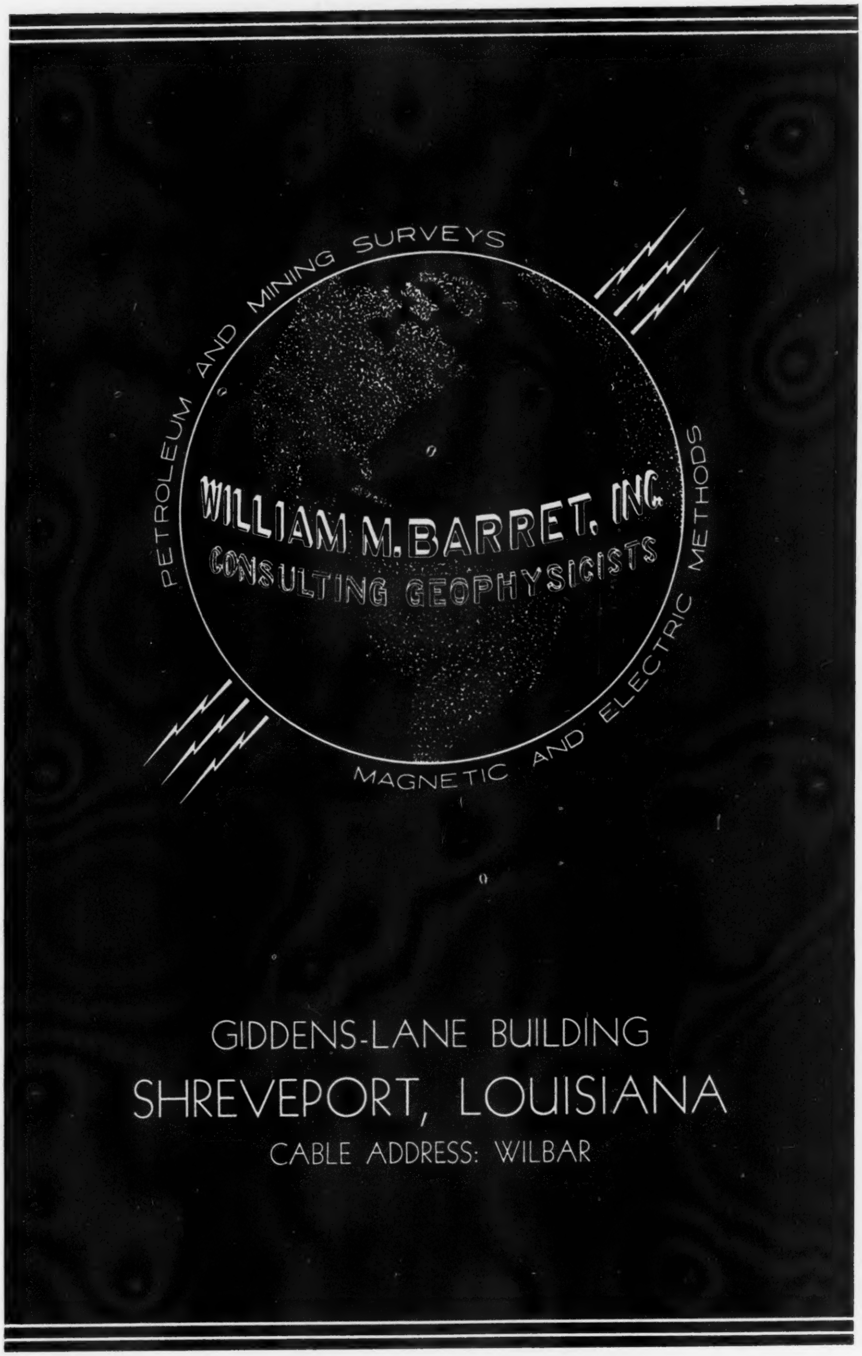
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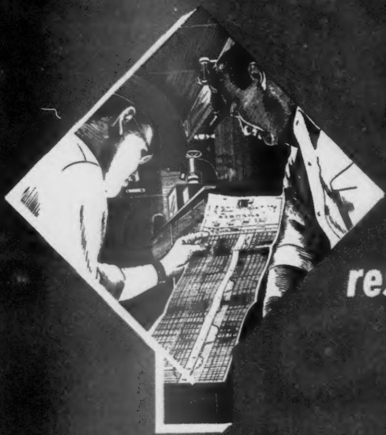

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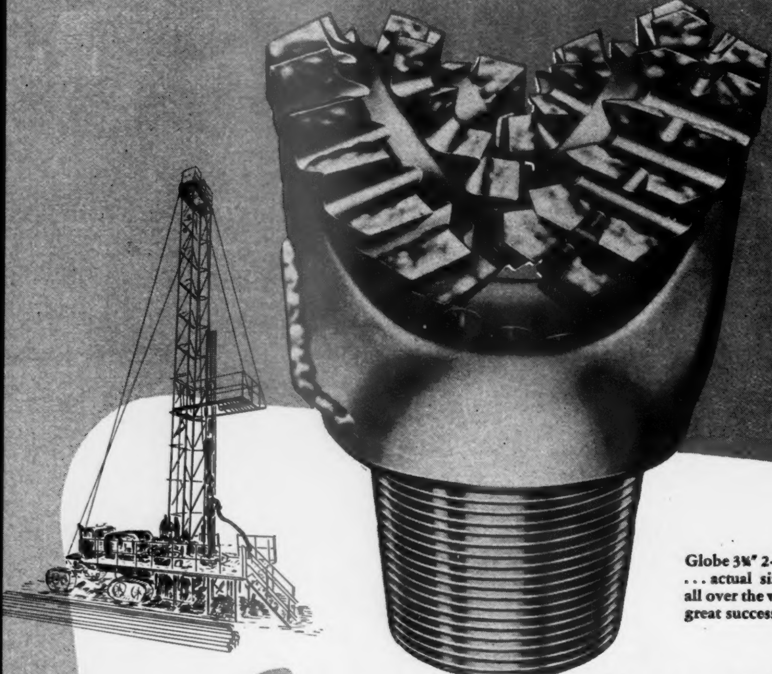

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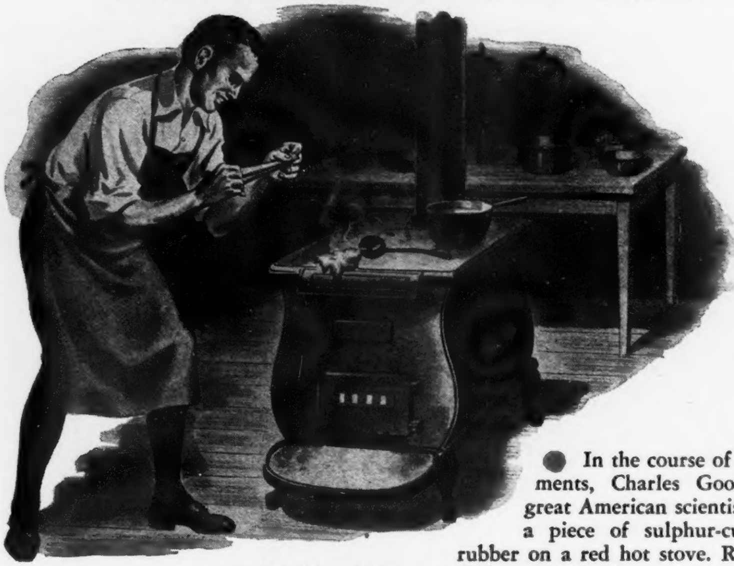

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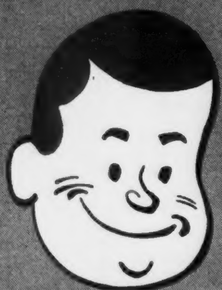

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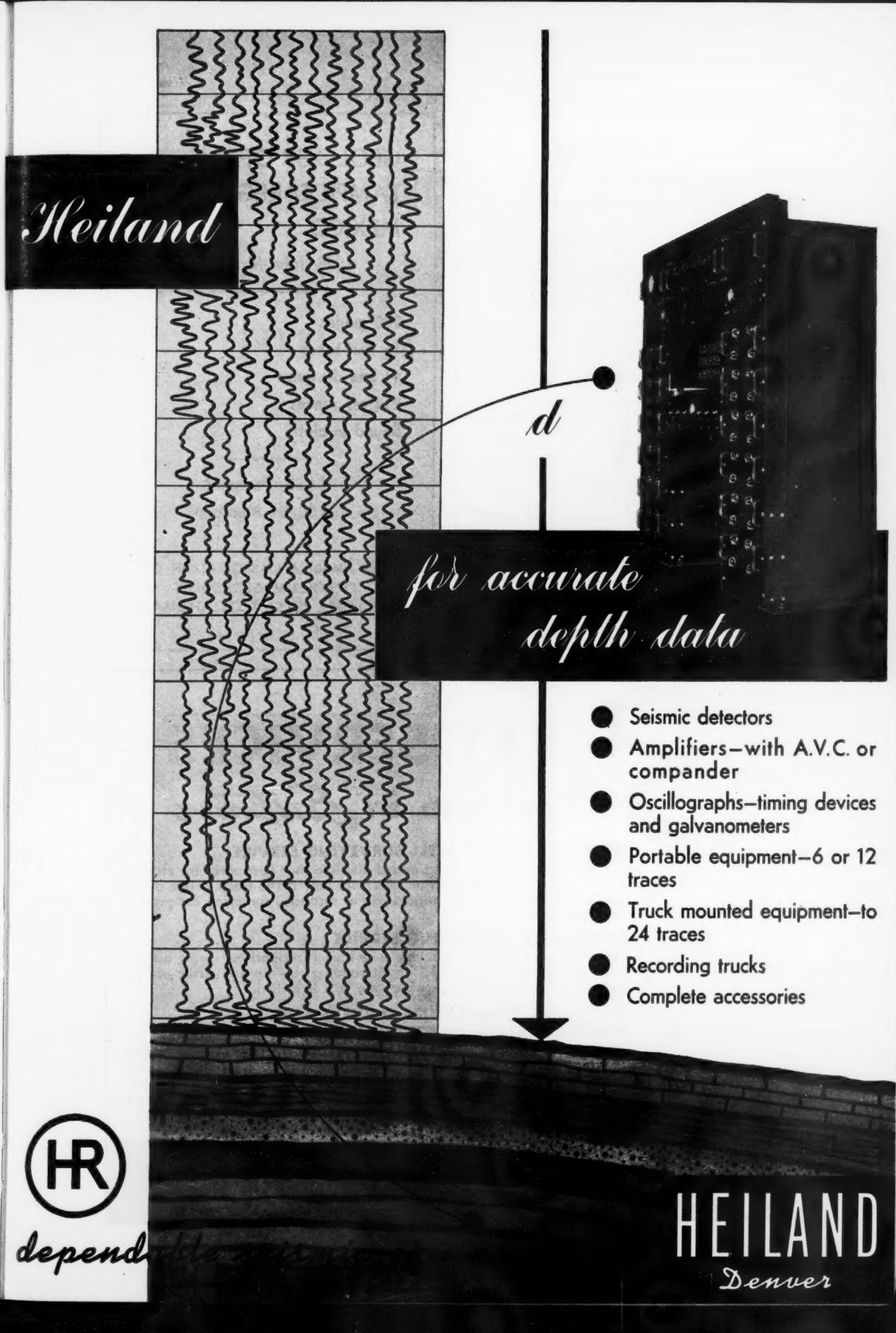
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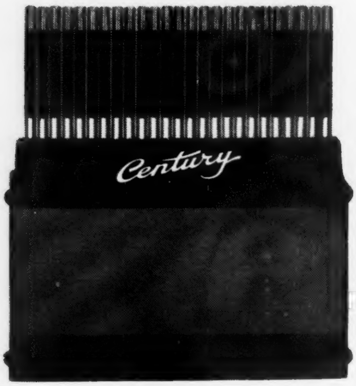

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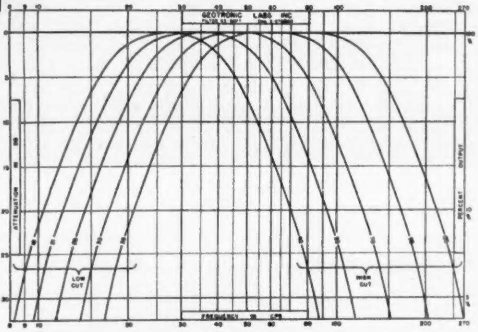

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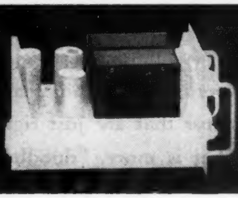

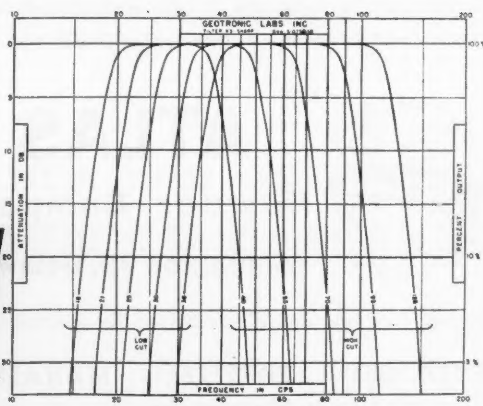

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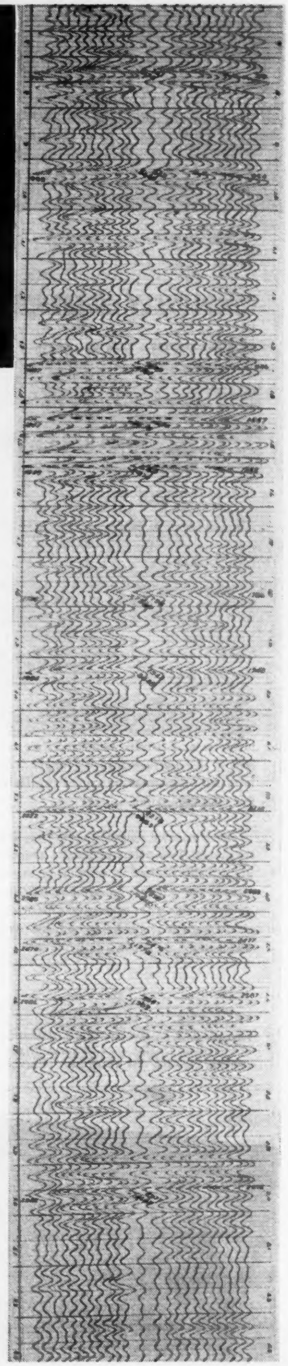

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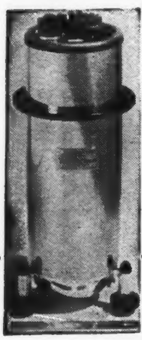

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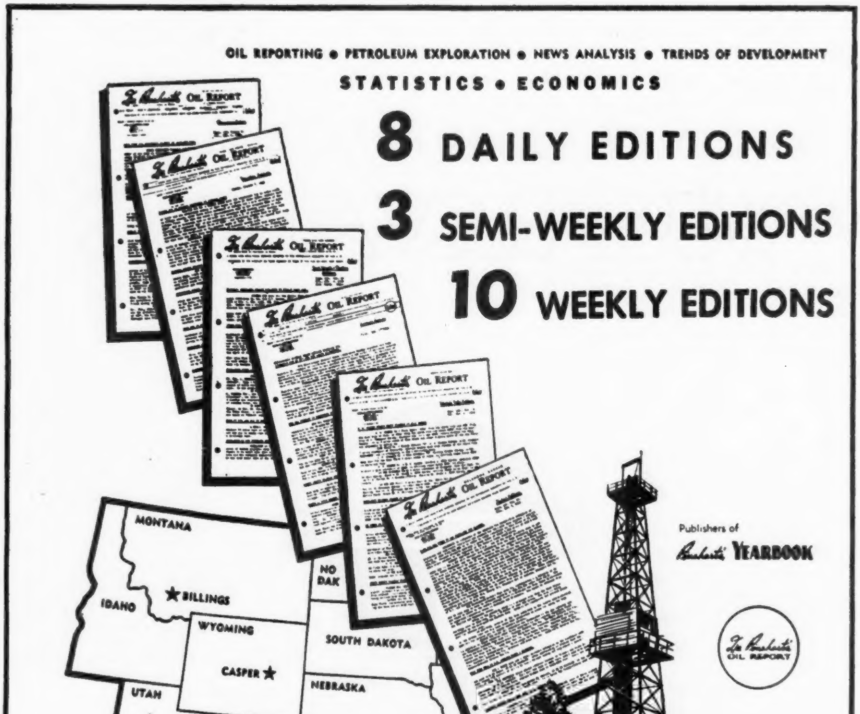
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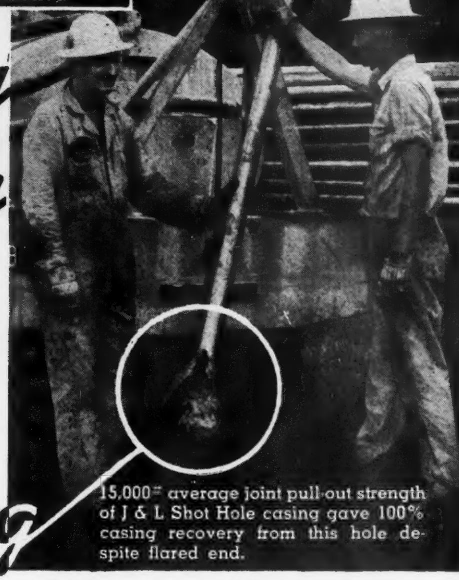

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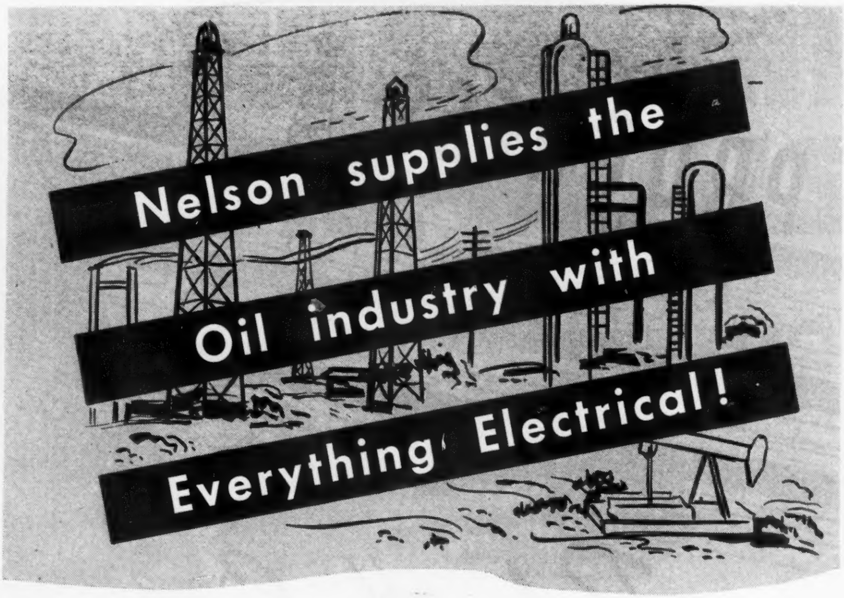

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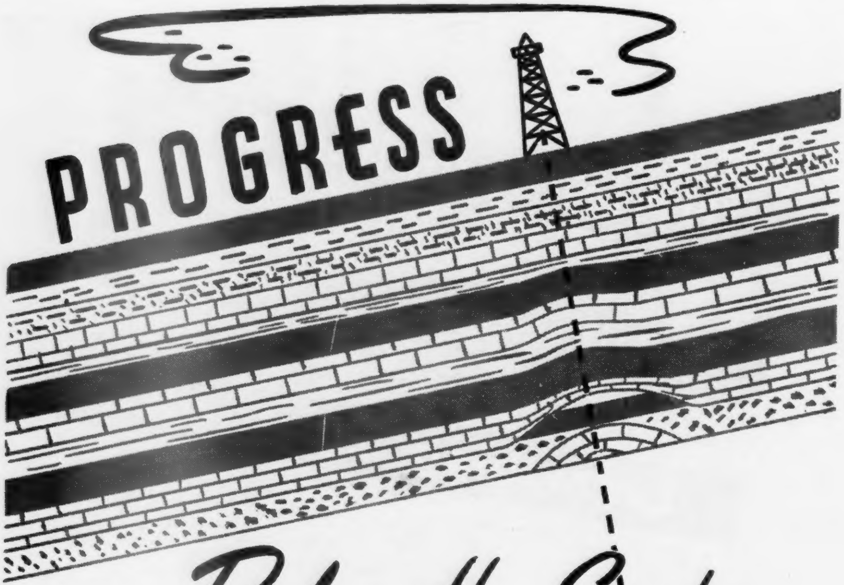

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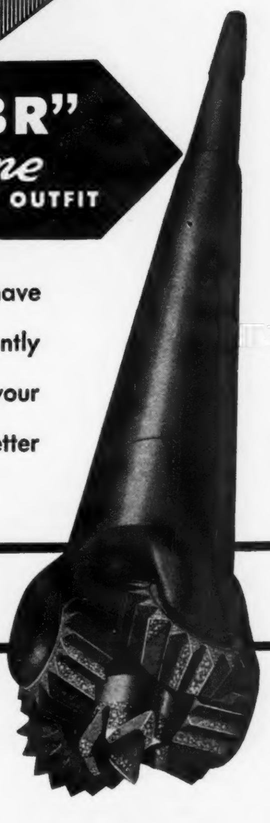

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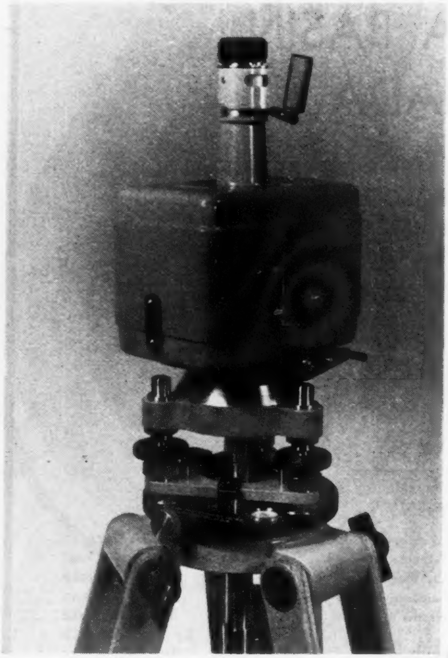

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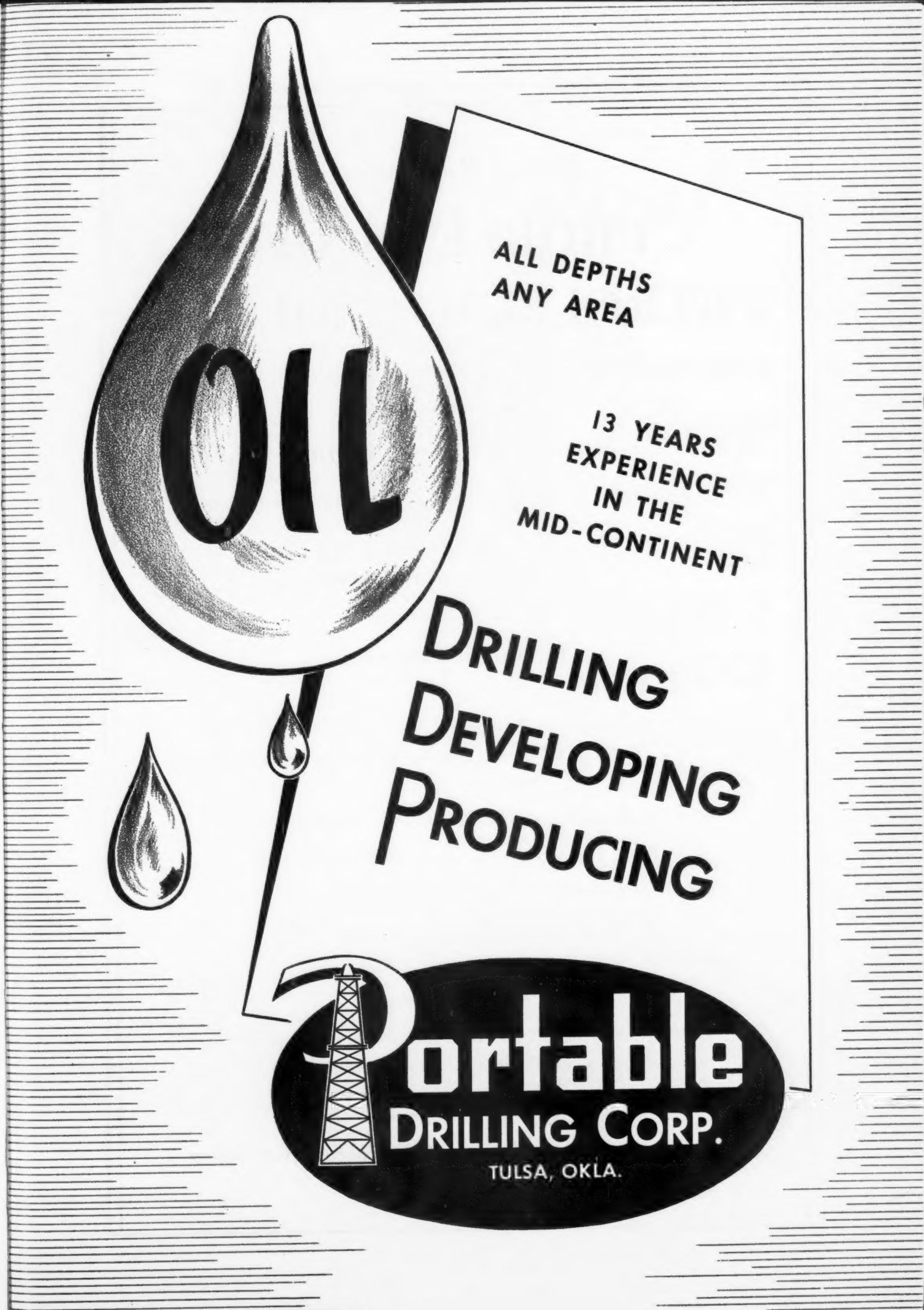
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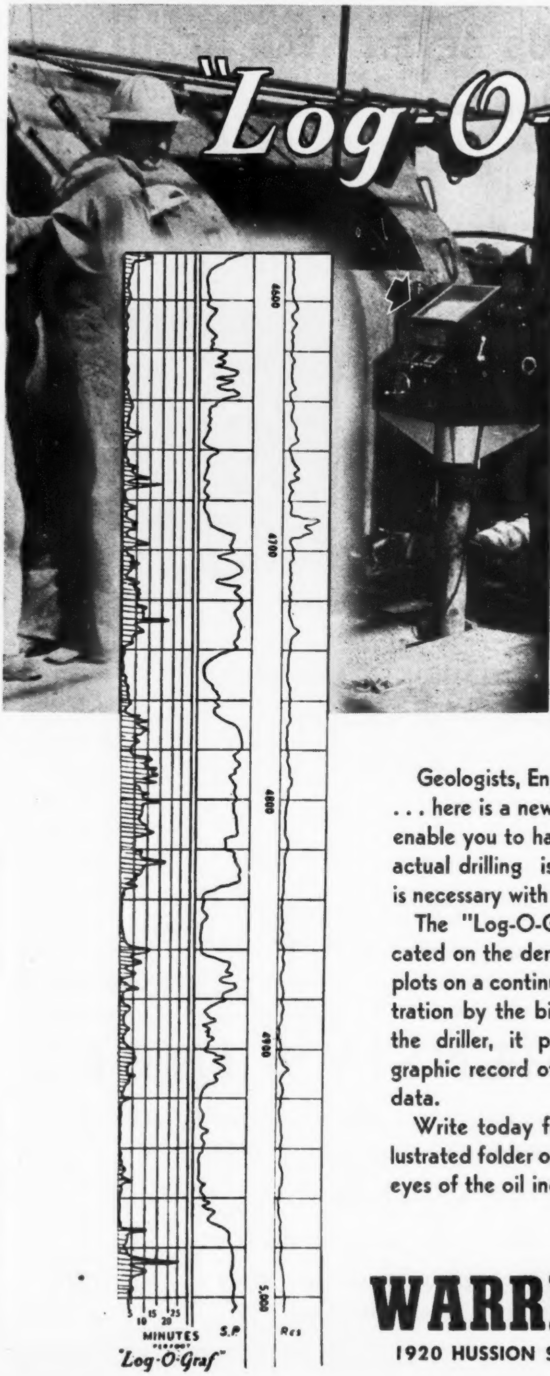

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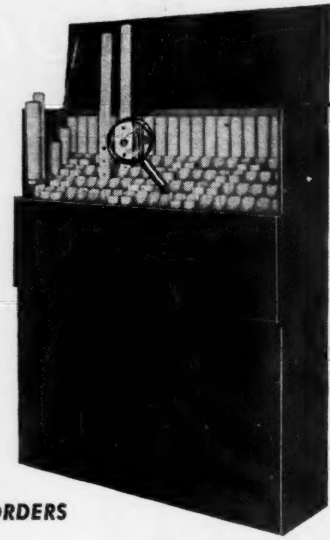

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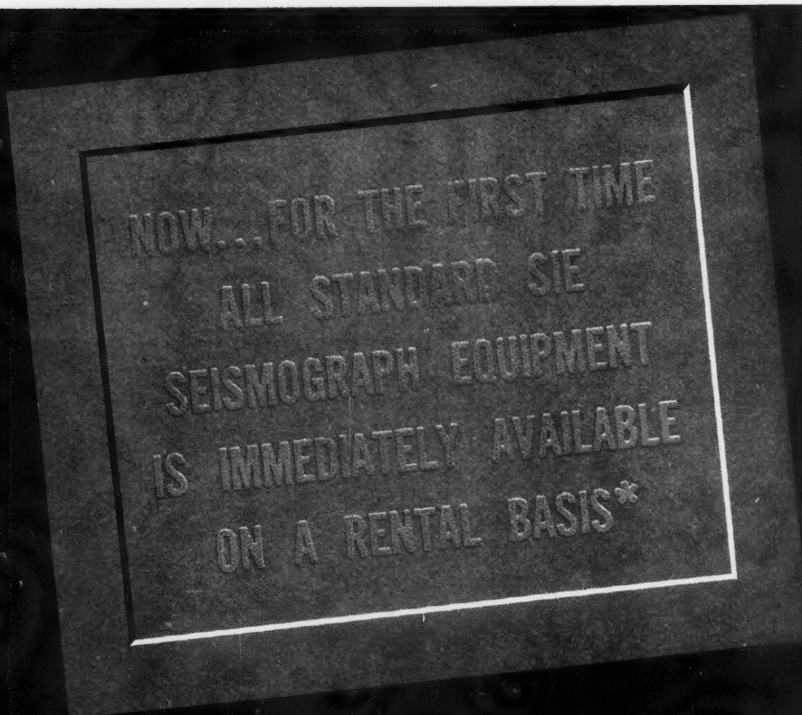

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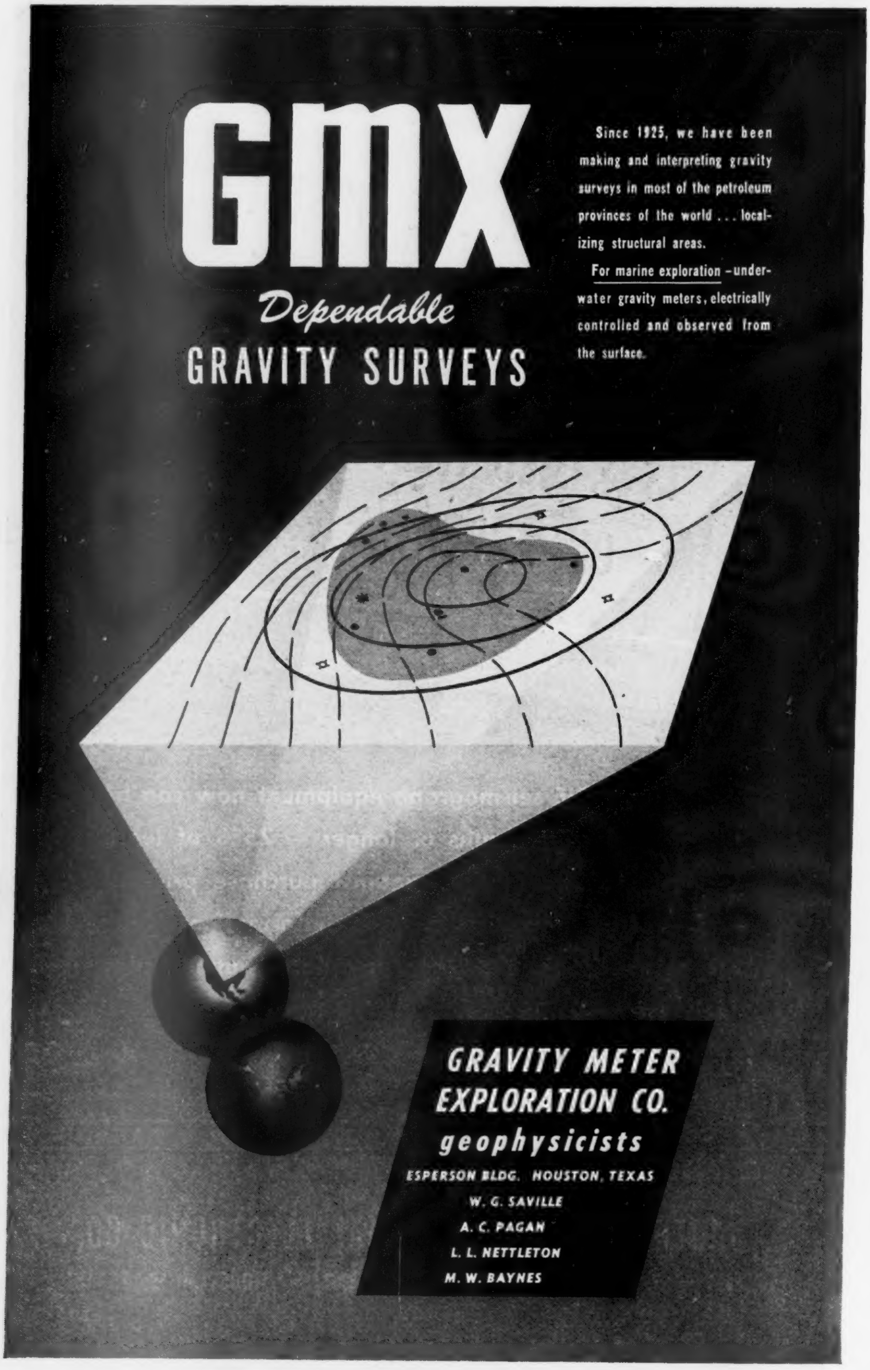

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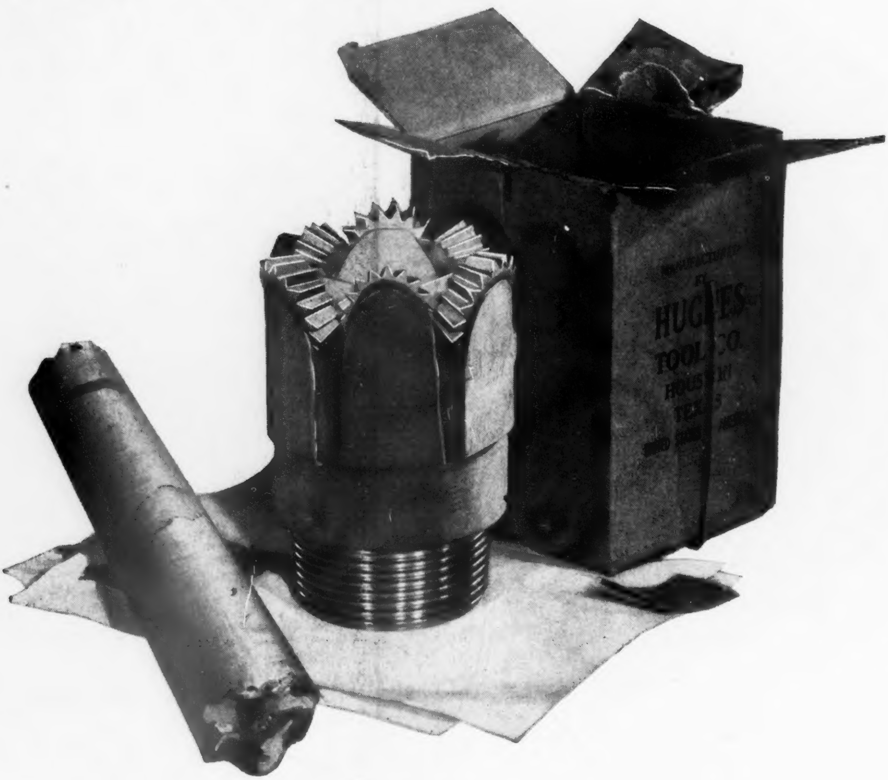

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